Application of Traditional Chinese Medicine Efficacy Marker Based on System of Traditional Chinese Medicine

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Abstract: In recent years, systemic Chinese medicine has been widely used in current pharmacological research, such as network pharmacology, system pharmacology, and integrated pharmacology, which has greatly promoted the development and improvement of system science theory. During the research process, we can see that the system of Chinese medicine focuses more on system-based thinking to recognize Chinese medicine issues from a new perspective, including the quality control of Chinese medicine, the overall efficacy of Chinese medicine, the theory of Chinese medicine properties, and the ratio of traditional Chinese medicine prescriptions, so Promote the development of the theoretical system of traditional Chinese medicine. This article takes the study of efficacy of traditional Chinese medicine as the starting point, explores the scientific connotation of efficacy markers of traditional Chinese medicine based on systematic theories and methods of traditional Chinese medicine, and chooses scientific and reasonable methods of finding traditional Chinese medicine efficacy markers based on systematic traditional Chinese medicine to determine effective traditional Chinese medicine efficacy markers. .

1. Introduction

The quality markers of traditional Chinese medicine emphasize the correlation with the theoretical system of traditional Chinese medicine. Through the identification of specific collection period, the quality attributes of traditional Chinese medicine can be effectively distinguished, and the correlation with clinical efficacy or safety is more emphasized, and the analytical method economy can be achieved through testability. The application and operation are simple, and the product traceability of the whole process of clinical application is realized. Based on the study of quality markers of traditional Chinese medicine, combined with the systemic theory of traditional Chinese medicine, the concept of traditional Chinese medicine efficacy markers was explored, and the rules for determining the traditional Chinese medicine efficacy markers were found to be of great significance for the modernization of traditional Chinese medicine. Therefore, this article takes the study of traditional Chinese medicine efficacy as the starting point, explores the scientific connotation of traditional Chinese medicine efficacy markers based on systematic traditional Chinese medicine theories and methods, and chooses a scientific and reasonable method for finding traditional Chinese medicine efficacy markers based on systematic traditional Chinese medicine in order to discover effective traditional Chinese medicine efficacy Markers and applied in clinical treatment and research.

2. Discovery of Traditional Chinese Medicine Efficacy Markers Based on Systemic Medicine

2.1 Chinese Medicine Efficacy Marker Discovery Process

From a systematic perspective, traditional Chinese medicine is a relatively complex chemical system. The interaction between chemical substance entities and the molecular network of living organisms in Chinese medicine is vague and difficult to quantify. Combined with related research, it is found that chemical quality evaluation is the main mode of quality control of traditional Chinese medicine. The selection of index components has successively appeared concepts such as

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characteristic components, active components, and active components. The key scientific issue of the quality markers of traditional Chinese medicine is to pursue the qualitative and quantitative characterization of the overall quality attributes and biological effects of traditional Chinese medicines with a few representative ingredients. The relationship between the effects of specific quality markers of traditional Chinese medicines is shown in Figure 1. It can be seen that the quality markers of traditional Chinese medicine are not simple scientific concepts, but also have deep-level philosophical thinking. It is self-evident that it is important to improve the development of modern Chinese medicine theory.

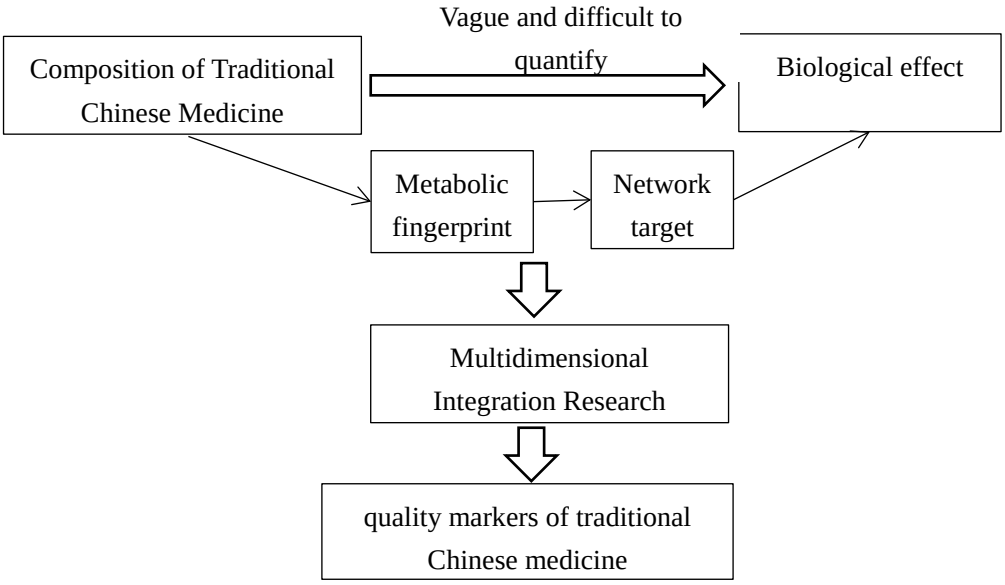

Fig.1 Quality Markers of Traditional Chinese Medicine

From a system perspective, the effectiveness of traditional Chinese medicine is the interaction mechanism between various complex systems, and the system mainly has an organic whole with specific functions through interaction with the external environment, including boundaries, elements, relationships, structures and functions . Generally speaking, the boundary of the system is the boundary that separates the system from the environment. Only after the system boundary is clear can the subsequent analysis work be continued. The elements of the system are the elements that make up the system, and are the basis for the occurrence, development, and change of the system, and the relationship between the elements is the connection between the elements at the same level. The structure of the system is the internal structure of the system. It is formed by the connections between elements at different levels. The structure cannot exist without the elements. The function of the system is the overall characteristics, behaviors, effectiveness, and performance of the system in its interaction with the environment. effect. Therefore, from the perspective of systems science, the first task of researching the efficacy markers of traditional Chinese medicine based on pharmacy in the system is to clarify the boundaries, elements, structures and functions in the system. Under this premise, rational use of traditional Chinese medicine efficacy marker discovery methods based on the system of traditional Chinese medicine, including data mining technology, molecular simulation technology, literature mining technology, static and dynamic biological network technology, in vivo and in vitro pharmacological experiments, etc., in order to identify the key of the Chinese medicine system Factors, so as to discover and apply traditional Chinese medicine efficacy markers, as shown in Figure 2.

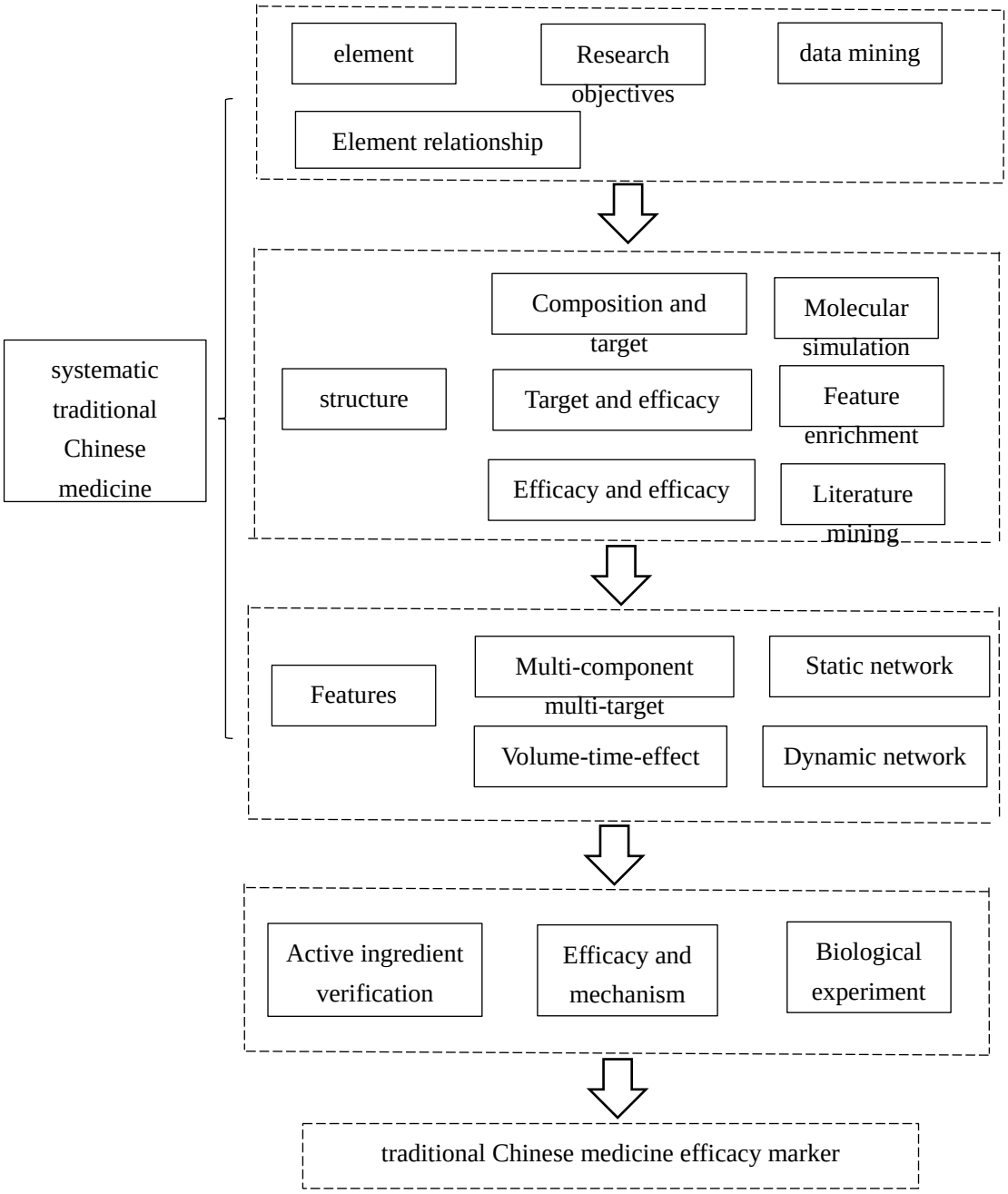

Fig.2 Flowchart of Chinese Medicine Efficacy Marker Discovery Based on Pharmacy in the System

2.2 Research Methods of Chinese Medicine Efficacy Markers Based on System of Traditional Chinese Medicine

In order to identify the efficacy markers of traditional Chinese medicine and understand its mechanism of action, it should be combined with network pharmacology, systems biology, and systems pharmacology systems to make full use of emerging technologies such as data mining, molecular simulation, and biological networks to discover traditional Chinese medicine efficacy markers. Therefore, some researchers analyze the mechanism of traditional Chinese medicine from the perspective of combining dry and wet experiments, and guide the selection of potential index components that can represent the efficacy of traditional Chinese medicine from the library of traditional Chinese medicine ingredients. The discovery laid the foundation.

First, define the boundaries and elements of the system. Based on the discovery and application of Chinese medicine efficacy markers in the system of pharmacy, first of all, the boundaries and elements of the system need to be clarified from massive data information. TCM has a long history of development, and has accumulated a lot of relevant experience and information on clinical,

prescriptions, decoction pieces, etc. in the continuous development process, especially the research on chemical components and pharmacological effects of modern Chinese medicine. On this basis, data mining technology integrates knowledge and technologies in multiple fields such as database technology, machine learning, statistics, etc., which can extract valid information from a large, incomplete, noisy data set, and help identify massive The effective information and action rules in the data, thereby clarifying the boundaries and elements of the system.

Second, clarify the structure of the system. The structure of the traditional Chinese medicine system is composed of the relationships between the elements in the system. Based on the discovery of the traditional Chinese medicine efficacy markers in the system, the relationship between the traditional Chinese medicine components, target targets, pharmacological effects and efficacy must be clarified. The chemical composition of traditional Chinese medicine is the material basis for its effect. The target of traditional Chinese medicine is its effective way to exert its effect. The efficacy of traditional Chinese medicine is a high summary of its pharmacological effects. Therefore, in the study of the system structure, the relationship between the components of the traditional Chinese medicine and the target of the effect, the relationship between the target and the effect of the medicine, and the relationship between the effect of the medicine and the efficacy should be clarified, in order to find the efficacy markers of the Chinese medicine.

Third, clarify the overall function of the system. The research on the efficacy markers of traditional Chinese medicine needs to combine the results of research on active ingredients, target targets, pharmacological effects, and efficacy of traditional Chinese medicine in the system to clarify its overall functional effectiveness. At present, research in this field generally focuses on the pharmacological effects of a single component or a class of extracts, understands the mechanism of action and pharmacological effects of a drug from a local perspective, and cannot systematically explain the material basis of the efficacy of Chinese medicine from a global perspective. Because the chemical composition of traditional Chinese medicine is complex, and various diseases caused by the human body are also the result of comprehensive regulation of multiple biochemical reactions, the relationship between this traditional Chinese medicine ingredient, action target, pharmacological and pharmacological effects, and disease symptoms forms a complex network system. .

The proposal of systematic pharmacology has proposed a new idea for the study of efficacy markers of traditional Chinese medicine. It can not only graphically and comprehensively display the biological information of complex systems, but also can integrate mathematical models to perform various reactions in the system. Calculate, simulate and predict the dynamic behavior of the human body when it is subjected to external stimuli in response to changes in the external environment. However, it is worth noting that the study of the efficacy markers of traditional Chinese medicine can not only stop on the study of static networks. As the dose of drugs continues to increase, the intensity of the overall influence of drugs on the network will also change, changing the network from static to dynamic. The discovery of Chinese medicine efficacy markers provides new ideas.

3. Application of Chinese Medicine Efficacy Markers Based on System Chinese Medicine

Compared with the traditional single-component or pharmacological research, the system-medicine-target-disease-syndrome combination analysis of traditional Chinese medicine is more in line with the overall characteristics of traditional Chinese medicine. This method can be used to explore the efficacy markers of traditional Chinese medicine and find potential new targets for traditional Chinese medicine Methodology tools. However, the accuracy of this method is controversial, and subsequent follow-up tests need to be performed through in vitro and in vivo experiments in cell biology and animals to provide effective evaluation criteria for the discovery of efficacy markers based on pharmaceuticals in the system. Some researchers have used the existing grammatical efficacy combination of traditional Chinese medicine to correlate with pharmacological effects, and use the solid grammar system to construct a network of pharmacological effects and efficacy of traditional Chinese medicines. The method proved by the

literature and the literature confirms the reliability of the network screening results. It was found that quercetin inhibits adipocyte differentiation and lipid formation, and its IC 50 content is 2.5 μmoL·L -1, which has potential lipid-lowering effects.

The study of the efficacy markers of traditional Chinese medicine is the key to clarify the efficacy of traditional Chinese medicines, their pharmacological effects and their mechanisms, and clinical efficacy. It is also an important basis for the deep development of traditional Chinese medicine prescriptions, formulation of quality standards, and improvement of clinical efficacy. To discover the efficacy markers of traditional Chinese medicine, it is necessary to clarify the chemical and biological basis of traditional Chinese medicine's effectiveness. However, the traditional chemical basis of traditional Chinese medicine is mainly to isolate and extract the chemical components of traditional Chinese medicine and to identify the structure, combined with biological activity screening, determine its effective ingredients, and clarify the material basis. Traditional Chinese medicine biology research is carried out from the perspective of pharmacological indicators, gene protein expression and metabolic differences.

With the development of technology and the improvement of instruments and equipment, great achievements have been made in the research of the chemical basis of traditional Chinese medicine, and the basic research of the biology of traditional Chinese medicine has also developed from a single indicator to multiple indicators, from decentralized research to systematic research. However, due to the complex chemical composition of traditional Chinese medicine, which contains hundreds or even thousands of chemical components, there are characteristics such as multi-components, multi-targets, and multi-path synergy, which are far more complex than linear dose-effect, structure-effect, The scope of the description of conventional pharmacology based on aging brings great difficulties and challenges to the basic research of chemistry and biology of Chinese medicine. The pharmacy in the system can describe the pharmacological and pharmacological effects of drugs on the human body at a macro level, and can also calculate the combination mode, intensity, and law of action between drugs and targets at the molecular level. It is an effective strategy for the discovery of traditional Chinese medicine efficacy markers method. Firstly, based on data mining technology, clear the boundaries and elements of the system from the mass information, that is, the access principles and scope of the source data, and build a database for subsequent research to ensure the accuracy, completeness and representativeness of the data source.

In addition, using molecular simulation, network module function enrichment analysis, and literature mining technologies to clarify the role of drugs and targets, target and drug efficacy, and drug efficacy and efficacy, that is, to clarify the internal structure of the system, and on this basis Construct a multi-dimensional network of “medicine-target-disease-proof”, based on the network dynamics model, dynamically simulate the strength of the impact of the drug on the overall network after entering the human body, build a quantitative relationship between the multi-components and activity of traditional Chinese medicine, and discover the regularity of traditional Chinese medicine composition The degree of efficacy of each component on the overall efficacy, that is, the function of the system is clarified, and the candidate traditional Chinese medicine efficacy markers are qualitatively and quantitatively screened. Based on this, through in vivo and in vitro pharmacological evaluations, it can be verified whether the active ingredient can be transported into the blood as a substrate and absorbed into the blood, and whether it can become a signature component representing efficacy, which illustrates the accuracy of the calculation results.

4. Conclusion

It can be seen that the research on the efficacy markers of traditional Chinese medicine, like complex systems, requires clear system boundaries, elements, structures and functions. From the data mining, the boundaries and elements of the system are identified, the structural relationship between the drug and the target, the target and the drug effect, and the efficacy in the system is identified. Finally, the overall function of the system is demonstrated based on static and dynamic networks and pharmacological experiments. From qualitative to quantitative, from the micro to the macro research process, to achieve the qualitative and quantitative characterization of the overall

efficacy properties of traditional Chinese medicine through a small number of representative ingredients, effectively answer the key scientific questions of traditional Chinese medicine efficacy markers. However, there are still problems such as dynamic network research that are not applicable to complex large-scale metabolic networks and cannot realistically simulate the complex environment in the human body. The persuasiveness still needs further research and confirmation. These need more and more in-depth research to promote Development and application of Chinese medicine efficacy markers.

5. Acknowledgment

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