The Connotation and Extension of Chinese Medicine Animal Model

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Abstract

Objective: Clarify the concept of Chinese medicine animal model and explore the connotation and extension of Chinese medicine animal model. Method: Check out the literature on Chinese medicine animal model in "China Knowledge Network", explore the relationship between Chinese medicine animal model and Chinese medicine and pharmacology research, analyze the definition, connotation and extension of Chinese medicine animal model and put forward ideas for the development of Chinese medicine animal model. Result: Using experimental animals to explore the basic theories of Chinese medicine and the etiology and pathogenesis of the disease, we can reveal the efficacy characteristics, compatibility, safety prediction of Chinese medicines and preparations, and better serve the clinic. Conclusion: At present, the research on experimental models of Chinese medicine animals is still at a preliminary stage of exploration, and it is impossible to make full use of syndrome differentiation and basic theory of Chinese medicine to provide ideal experimental vectors. By exploring the basic theories of Chinese medicine and the etiology and pathogenesis of Chinese medicine, it reveals the therapeutic characteristics, compatibility and toxicity of Chinese medicines and preparations; it provides scientific and accurate basis for clinical treatment of diseases.

Concept of Chinese Medicine Animal Model

Under the guidance of the overall concept of Chinese medicine and the idea of syndrome differentiation and treatment, Chinese medicine animal model uses the theory of dirty elephants and the etiology and pathogenesis of Chinese medicine to replicate certain characteristics of human disease prototypes on animals, forming symptoms and pathologies of human diseases. Change a subject of the same or similar syndrome[1]. Chinese medicine practitioners have studied the model in ancient times. As early as in Tang·Cang’s “The Herbal Supplement”, there are records: "Glutinous rice and glutinous rice, feeding kittens and dogs, making the feet flex and stretch cannot be done". Six animals were observed as the effect of copper briquettes, and cattle and horses were used as animal models for the observation of soybean cold temperature; "Materia Medica" describes the natural copper feeding fracture gese model, and it is concluded that natural copper has bones; Song-“The Sketch Book” records: “If you want to try the party ginseng, when you let the two go together, one with ginseng, one does not, and walks three or five miles, and it does not contain ginseng, With a breath of breath, its body is true too”; Ming ·Li Shizhen's "Compendium of Materia Medica” used horses to observe the experiment of athlete's foot in glutinous rice, and personally conducted human experiments to study the anesthetic effect of mandala flowers.

The Connotation of Chinese Medicine Animal Model

The animal model of Chinese medicine is the main research object of experimental animals, covering the strains, species, grades and environment of the experimental animals. The research of experimental animal models includes basic theories of Chinese medicine, experimental zoology, clinical diagnosis and treatment standards of Chinese and Western medicine, establishment of animal models, experimental methods and techniques.

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Basic Theory of Chinese Medicine

The basic theory of Chinese medicine\(^2\) began in the "Yellow Emperor's Internal Classics", including the philosophical foundation, Tibetan elephant, meridian, pathological pathogenesis and governance and other aspects, from a macroscopic and systematic perspective to understand human physiology, disease, diagnosis, treatment, Prevention, health and relationship with nature and society. Chinese medicine theory is an important part of the basic theory of Chinese medicine, and its essence is its pharmacological effect\(^3\). It plays a leading role in the counter-evidence of animal models.

Chinese Medicine Experimental Zoology

The main research object of experimental zoology of Chinese medicine is experimental animals. It is a new discipline formed by the combination of experimental zoology and Chinese medicine. It is the thinking and practice of Chinese medicine in the application and development of experimental zoology. This is the experimental zoology of Chinese medicine. The key to it. Chinese medicine uses the natural analogy of the heavens and the earth to summarize the physiological and pathological state of the human body. With the aid of medicine, the Chinese medicine animal model is established, and some stable characteristics of the experimental animals are summarized by Chinese medicine symptoms, and combined with the theory of Chinese medicine, the Chinese medicine animal model is guided to set up. The most important advantage of Chinese medicine syndrome differentiation is the combination of physical constitution, etiology and symptoms, and the use of objective indicators and drug counter-evidence methods to qualitatively and quantitatively serve as an important reference indicator for Chinese medicine syndromes.

Chinese and Western Medicine Clinical Diagnosis and Treatment Standards

According to the physiological characteristics of rats and mice, Chinese medicine gradually formed the “four diagnosis” collection and standardization methods of rats and mice in the long-term research process to detect the differences in physical characteristics of normal mice and the syndromes and evolution of diseased mice. Metabolomics techniques can be used to suggest changes in the syndrome through molecular changes in the syndrome model (heat syndrome). The study of blood stasis syndrome is based on the general state of the animal, tongue color, activity, blood rheology, electrocardiogram, coagulation function and other aspects of qi deficiency and blood stasis syndrome evaluation. Combine the animal model with the disease, draw on the objective research results of the four clinics, and also reduce the symptoms after taking the Xuefu Zhuyu Decoction through drug intervention, such as the coronary heart disease blood stasis syndrome model; Pathological biochemical indicators and the overall relevance of disease assessment, gene, protein, metabolism and other omics techniques link abstract syndromes with objective quantitative indicators\(^4\).

Western medicine often uses index changes to evaluate the disease of model animals, giving priority to its pathological biochemistry. Model animals in the process of disease development, body metabolism, functional status and other aspects will change more than usual. Therefore, under the premise of grasping some pathophysiological changes related to diseases, the animal model of disease syndrome is evaluated by real-time monitoring of changes in biochemical components. In summary, animal model evaluation usually evaluates animal models from macroscopic characterization, microscopic indicators, and prescription verification\(^5\).

(1) Evaluation of macroscopic representation

Observe the behavioral changes of experimental animals, such as evaluation of emotional illness animals\(^6\), using open field experiments, aggressive behavior tests, sugar water preference experiments, forced swimming experiments, tail suspension experiments, elevated plus maze experiments and bright and dark boxes and other experimental methods. If the animal model is successfully prepared, the skin's appearance can be clearly diffuse erythema, finely divided scales; small pieces of tan knots, skin hair easy to fall off\(^7\).

(2) Evaluation of micro indicators

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In the experimental research of Chinese medicine, there are also objective indicators of syndromes, such as pathological changes, endocrine and functional changes, changes in blood and microcirculation, and even molecular and genetic changes. To explore the protective effect of total flavonoids of rose on focal cerebral ischemia-reperfusion injury in mice, the content of S-100β protein in serum was measured, and TTC stained with brain tissue was taken to calculate the infarct size. The specific pathological indicators of syndromes provide a scientific basis for the evaluation of the model.

(3) Side verification for evaluation
The Chinese medicine practitioners require that the prescriptions be “followed by the law, and the law shall follow the certificate”. The drugs or prescriptions closely related to their indications must be used to test whether the syndromes are successfully replicated. Banxia Xiexin Decoction can regulate the gastric mucosa and promote the repair of gastric mucosa by regulating the content of vasomotor factors NO and ET-1, and obviously improve the pathological morphology of gastric mucosa in rats with gastric ulcer. The model succeeded.

Application of Chinese Medicine Animal Model
The establishment and research of Chinese medicine animal model is a bridge and link connecting basic research and clinical application of Chinese medicine. The establishment of the model pays more attention to the essence of Chinese medicine pathogenesis and is beneficial to the study of drug action mechanism. If the established formula is used to counteract the established model, the therapeutic principle of the prescription can be explored, and the treatment mechanism of the proprietary Chinese medicine or the single-flavor medicine can also be explored. For example, the intervention of pinellia xiexin decoction on gastric ulcer rats can promote the healing of ulcers and reduce the recurrence of ulcers after healing: Further analysis on the decoction of pinellia purpura decoction reveals that the main drug to promote the healing of ulcer and reduce the recurrence of ulcer after healing is ganbu group, but the group with the best curative effect is quanfang group. Shaofu Zhuyu Decoction Chinese medicine (clinical dose) can alleviate primary dysmenorrhea in rats and reduce the contractile strength of uterus in rats. The mechanism may be related to the decrease of PGE2 content and platelet adhesion index in rats with dysmenorrhea.

Animal Experiment Techniques and Methods
The design of animal experimental research should be based on the principles of need, purpose, science, feasibility, controllability and economy. Standardizing the technical operation of animal experiments is one of the important conditions for obtaining accurate experimental results. It includes creating a comfortable environment for animals, timely feeding, double marking, gender confirmation, daily observation of animal status, establishment of models, relevant surgical operations, drug administration, acquisition of biological specimens, acquisition of biological indicators, matters needing attention, etc. Control group and blank group were set to verify whether the model was successful. The influencing factors of mold making are as follows: Climatic factors mainly include temperature, humidity, wind speed and ventilation times; Physical and chemical factors mainly include illumination, noise and air cleanliness, etc. The housing factors mainly include the cages used in animal feeding, the feeding density of animals, the feeding methods, the bedding materials used and the drinking water, etc. Biological factors mainly refer to the influence of microorganisms (mainly pathogenic microorganisms) in the living space of animals on animals, and also include the interaction between homogenous animals and heterogeneous animals. The factors of the animal itself mainly include the species and strain of the animal (the two are genetic factors), age and weight, physiological status, health status or potential infection (the degree of microbial control), etc. Human factors include pure reagent, sensitive instrument, correct method, skilled operation, route of administration, dosage form and dose in animal experiments.

Extension of Experimental Animal Model of Chinese Medicine
Animal model of Chinese medicine is closely related to Chinese medicine experimental research,
pharmacological experimental research, experimental pathology and molecular pharmacology. It is an important means to carry out modern Chinese medicine research and pharmacological experimental research, and provides a good prospect for the clinical application of Chinese medicine.

Experimental Methodology of Traditional Chinese Medicine

Experimental research on Chinese medicine is a new discipline developed in recent years. It is mainly to verify or discover the efficacy, toxicity or the corresponding mechanism of Chinese medicine through experimental research. Experimental animals are taken as research objects, and humans are also taken as research objects. Experimental research on Chinese medicine can verify and develop Chinese medicine theory, and provide scientific basis for clinical application.

Pharmacological Experimental Methodology

Most of them use animals to replace human body. There are many similarities between human body and animals, involving genes, proteins, physiology, biochemistry and pathology. Therefore, a medical experiment mode has been formed that animal exploration of the efficacy, toxicity and side effects of Chinese medicine, drug screening and so on have transited to clinical observation.

Experimental Pathology

Animal models of some human diseases can be reproduced in suitable animals by animal experiments. Through the process of disease replication, the etiology, pathogenesis, pathological changes and the outcome of the disease can be studied, which is an important basis for judging the success of the model.

Molecular Pharmacology

Molecular pharmacology is an important branch of pharmacology and a frontier subject in the development of pharmacology. Taking molecule as the basic functional unit, the theory and technology of molecular biology are used to study, analyze and clarify the interaction principle between drugs and the body from the perspective of molecular level and gene expression.

Expectation

In Chinese medicine, many problems such as drug function, therapeutic mechanism and target of action are not clear, which need to be explained convincingly by means of modern medicine. Therefore, the establishment of Chinese medicine animal model is the bridge between Chinese medicine and modern western medicine. By selecting appropriate animals, building models, and applying modern experimental methods and technologies, the study, interpretation and re-application of modern methods in Chinese medicine are conducted, thus providing another development path for Chinese medicine. Chinese medicine animal model is an important part of Chinese medicine research and an important means of Chinese medicine innovation and development. Currently, there are more than 200 methods to establish animal models of more than 100 syndromes, such as cold syndrome, heat syndrome, deficiency of the heart, liver stagnation syndrome, spleen deficiency syndrome, etc. In recent years, animal models of disease and syndrome combining disease and syndrome have been established, such as the mouse model of lung cancer with spleen qi deficiency syndrome and the rat model of coronary heart disease with Yang deficiency and blood stasis syndrome.

The clinical syndromes are complex and diverse. At the present stage, the research on Chinese medicine animal model is not perfect, the modeling method is not mature, the evaluation index is not standard, and it is not possible to make full use of Chinese medicine syndrome differentiation and basic theories of Chinese medicine to provide an ideal experimental carrier. Chinese medicine animal model combines experimental standardization with clinical practice, and through repeated verification to achieve real clinical effects, better serve the clinic and make rational use.
References


