Unclear Definition of their Bioactive Ingredients and Unclear Mechanism of Action

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Description

Metabolomics might be the most suitable method for the holistic view of HM, while challenges still exist in metabolomics-driven herbal research, such as the identification of metabolites or components. Although the database has increased significantly, identification of unknown metabolites and herbal components is a time-consuming and expensive process, which requires strict procedures to increase the reliability of identification. The Nobel Prize in Physiology or Medicine won by Tu You provided an opportunity for the world to learn more about HM. The complexity of herbal ingredients leads to an unclear definition of their bioactive ingredients and unclear mechanism of action. The value of HM has not been fully affirmed, mainly due to the lack of scientific research methods. After more than 20 years of development, chinmedomics is now regarded as a powerful tool to explore the efficacy and clarify the mechanism. Organically combines metabolomics with serum pharmacochemistry of traditional Chinese medicine. In short, metabolomics is used to reveal the biological mechanism. The serum pharmacochemistry of traditional Chinese medicine is to find the active components in vivo and then associate the endogenous biomarkers with the components in vivo, thus revealing the effective ingredients related to the effectiveness of herbal medicine. However, the basic molecular mechanism and the composition principle of these four herbs are still elusive.

Biomedical Exploration

Moreover, the overall treatment concept through multi-target and multi-path effects is widely known for most herbal medicine and it is still a huge challenge to explore its potential molecular mechanism of action. Therefore, more highly integrated and systematic research approach is urgently established for elaborating the action mechanism of herbal medicine on treating diseases. As mentioned earlier, there are very few studies on the application of exosomes as vehicles of Chinese herbal medicines in orthopedics. However, traditional Chinese medicine still plays an indispensable role in orthopedics and has helped clinicians to solve many problems in the treatment and rehabilitation of various diseases. In the future, whether exosomes can safely and accurately deliver Chinese herbal medicines to specific targets or organs, and make Chinese herbal medicines play a greater role in orthopedics deserving of future study.

Herbal Medicine

Herbal medicine (HM) is a potential treatment method of various diseases, a plentiful novel drug discovery resource, and usually has multicomponent pharmacological effects; these characteristics pose a great challenge to the modernization of HM. The complexities present in the chemical compositions of medicinal plants are currently an obstacle for the progression of HM for novel drug discovery, involving unclear bioactive compounds and mechanisms of action, undetermined targets for therapy, nonspecific features for drug metabolism, etc. Chinmedomics could be a great tool for future improvement and understanding of HM at the small-molecule metabolism level, helping to solve the scientific difficulties with HM from a metabolic perspective and promote active ingredient discovery and development on a new horizon. In recent years, it has been widely applied for the analysis of herbal constituents in vivo and in vitro. In this review, we highlight the value of chinmedomics in addressing metabolite analysis, biomarker discovery, discovery of natural products, technical challenges, interpretation of mechanism of action, discovery of active ingredients, and enhancing their biomedical value in a real world of biomedicine. This review also comprehensively covers the current state, challenges, and applications of high-throughput metabolomics.