

Recent creative innovations for modernizing traditional medicine

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1. Introduction

Traditional medicine with a profound historical background is a rich source of clinical experiences for thousands of years. It has shown promising therapeutic effects on complex disorders with a holistic approach. However, the multi-component and multi-target pharmacology of traditional drugs are not clearly understood with the current reductionist approach. Modernization of traditional medicine (TM) by means of modern technology and academic thoughts as well as innovative methods and scientific experiments helps better perception of the ancient wisdom behind traditional mechanisms. Besides, modernization of TM via new ideas from the globally accepted scientific standards can result in a series of highly active, safe, and controllable modern TM products (1). In this approach, advanced technology and innovative methodology play a key role in TM development. On the other hand, personalized medicine paradigm which is recommended in TM theories aims to achieve the proper diagnosis and treatment for each patient. It particularly focuses on the maintenance of health and enhancing the resistance of body to diseases (2). The present work was conducted to emphasize the pivotal role of utilizing modern innovations in TM systems.

Traditional medicine scholars such as Avicenna (980-1037 AD), the great Persian philosopher and physician, have contributed to cure diseases with a holistic approach. As modernism has adopted a materialistic attitude toward nature and excluded human soul from medical sciences, it has followed a more mechanico-chemical approach in treatment of patients. However, the recent clinical evidences support the idea that the materialist stance should be completed by a post-materialist paradigm (3). In fact, both the reductionist and holistic viewpoints should be considered, but now they are surrounded by disciplinary and cultural fashions. Organized scientific efforts are necessary to integrate both traditional and modern viewpoints in the post-genomic era.

TM provides a valuable source of inspiration for novel drug development. Recently, advanced empirical methodologies have been utilized to special natural remedies and to diagnose their active constituents. Furthermore, quality control is considered as a key factor for modern evidence-based traditional medicine researches and metabolomics is a promising tool in this case. Thus, high-throughput assays have been applied to fingerprint, standardize and increase the reproducibility of TM preparations. Discovering

Please cite this article as: Ghazaleh Mosleh & Abdolali Mohagheghzadeh. Recent creative innovations for modernizing traditional medicine. Trends in Pharmaceutical Sciences. 2022;8(1):1-4. doi: 10.30476/TIPS.2021.93166.1119

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artemisinin as an antimalarial medicine is a good example of using traditional knowledge in order to treat new incident diseases (4). The complex mixtures and natural products in TM possess multi-components, multi-targets, and synergistic effects. Therefore, chemistry-focused and target-directed studies have been unsuccessful to develop a scientific basis for TM theories, but the system biology approach is consistent with the holistic view of TM which defines health as a balanced state in the body system (5). On the other hand, the structural compatibility between human metabolites and TM compounds is much more than that for synthetic small-molecules and human metabolites. The majority of such compounds in TM preparations seems to support their potential for influencing multi-targets in pharmacological studies. Mapping of such structurally similar molecules onto their correlated biological pathways would recommend potential sites of interaction between human biology and TM-derived compounds (6). Besides, systems biology techniques together with reverse pharmacological approach provides a novel way for drug development. In addition, network pharmacology is another novel subject representing a holistic view of syndrome differentiation in TM and multi-layer networks of human body. On the other hand, recent pharmaco-toxicological studies have used omic techniques particularly metabonomics for TM products to facilitate the drug toxicity investigations. As a novel approach, many high-throughput analytical techniques such as the nuclear magnetic resonance (NMR), various chromatography techniques, and mass spectrometry (MS) methods are the major technologies which

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metabonomics is relied on. Development of these analytical techniques and emergence of novel methods will improve the TM toxicological research (7). TM industry has also undergone a rapid modernization process in the last 25 years. Thus employing the analyzing indicators to measure the scientific and innovative activities of this industry is required (8).

In recent years, systems biology studies on TM mechanisms of action have led to a revolution in understanding of traditional disease pathology and personalized medicine. It opens up a novel opportunity to reconsider TM procedures in biology. Therefore, it may develop effective diagnostic, predictive, and prognostic biomarkers to underlie a novel health-care strategy focusing on prevention (the early intervention) rather than merely focusing on the treatment of diseases (2). In fact, TM has an extensive preventive system of concepts for chronic disease management. The innovative RCTs integrated with TM pattern classification and disease diagnosis will explore more important contributions of TM treatment theory (9).

All in all, this study highlighted the importance of creative innovations in TM research and necessity of unification of TM and conventional medicine for human health.

Acknowledgements

Authors would like to thank Shiraz University of Medical Sciences, Shiraz, Iran.

Conflict of Interest

None declared.

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