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Research Article

Anticancer Drug Discoveries from Herbal Medicine

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Abstract

Chemical drugs from natural resource consist a half number of drug armaments worldwide. Growing attentions were emphasized on this special type of chemical drug development, especially drugs against cancer and metastasis. Integrating strategies of cutting-edge routines and updating clinical evaluative system may improve pharmaceutical outcomes and drug developing. To achieve this goal, medical knowledge of both eastern and western for cancer treatments must be united. This article addresses the landscape of herbal medicine and natural drug development for cancer treatments.

Keywords: *Natural Plant; Phytochemistry; Traditional Chinese Medicine; Herbal Medicine; Cancer Pharmacology; Drug Development; Antineoplastic Drug; Animal Model*

Introduction

Pharmacologic characters

Difference between synthetic drugs and natural chemical drugs, natural chemical drugs is of stronger medical armaments-high therapeutic index as well as low-rate of acquired drug-induced resistance in clinical trials.

Major challenge

Medicinal chemistry for herbal medicine is a complicated process of experimental drug screening and clinical developments [1,2]. New initiatives must be explored to overcome these kinds of obstacles. This perspective highlights this efforts against cancers.

Historic overview

General scenario of herbal medicine

Herbal medicine has a long history of evolution in styles and practice worldwide. In its early stage, herbal or animal medicines are widely utilized over many different countries, including Greece, Allopathic medicine, Ayurveda medicine in India and traditional Chinese medicine (TCM) [3-7]. Yet, most of such countries lost this tradition. As a well-known country with this legend, China still maintains herbal medicine in modern day because China preserves many ancient medical books by leading publication systems in the early world [5-7].

From herbal medicine to natural chemical drug

There are many differences between herbal medicine and natural chemical drugs. However, a deeper understanding of herbal medicine may help us discovery more effective natural chemical drugs. As we can see, different movements may promote natural chemotherapeutic drug developments. To clarify our vision on this matter, the major characters of TCM must be introduced.

Clinical practice for TCM

In TCM, formulae of herbal medicine may be represented in different forms and dosage-different formulae (Fangji, 方剂). Different herbal formulae can be utilized to treat one disease or symptom. However, one herbal formula can be utilized for different diseases or symptoms in a similar clinical situation. It may be regarded as tricky in western philosophy. But it is usual strategies in TCM practice. Next-generations of integrated techniques and treatments enables us quick development of modern pharmaceuticals. All of these medical explorations and drug development must go through robust experimental verification.

Current limitations for natural drug development

Nowadays, many different types of modern drug developments need huge funds to support. Drug producer is a pillar industry for a small number of world-leading countries, which is a highly competitive and adventurous job worldwide [8-13]. Nevertheless, drug discovery, development and manufacture have been entering into a bottleneck stage over the past two decades-declining of drug productivity and successful rates (phase II and phase III study) year-by-year [8]. These constantly declining of drug successful rates in clinical evaluation have multiple causalities, such as higher therapeutic demanding for new drugs as well as rising cost for cutting-edge equipment utility. As a result, it needs to learn from herbal medicine to promote drug developments [14,15].

Present landscape of herbal medicine in world arena

Drug development transformation

Facing the situations of high risks, cost surge and low productivity in modern drug developments, creative study for science and technology can provide unprecedented insights into therapeutics against cancer.

The advantages of natural chemical drugs comparing with synthetic chemotherapeutic agents as usual are low toxicities and drug cocktail (mixture ingredients). Of course, the drug combinational rules widely used in China may play pivotal roles for a variety of new lethal virus infections and late-staged cancer managements, which desperately needs good paradigm propagation worldwide.

To ensure a smooth progress of natural chemical drug developments, new ideas and perspective must be explored. Drug developers who have dual insights into both western and eastern medicine may be indispensable. Some medical articles and books in this respect can also attract the attentions of broad-ranges and get quick feedback in the clinic.

Current insights

Paradigm introductions for tumor treatments

Similarly, tumors are categorized with different historic subtypes and pathological stages [16-20]. This pathologic variation is very suitable for individualized therapeutics such as TCM, drug sensitivity testing and pharmacogenetic approaches [21-25].

The key quality of different chemotherapeutic agents is the balance between therapeutic responses and toxicities/risks, displaying as a therapeutic index gain [26]. Many currently incurable diseases, such as HIV-infections may come from shortage of effective natural chemotherapeutic drugs and fundamental knowledge of patho-therapeutic relationship. The only limitation of natural chemotherapeutic agents was the costs of drug purification and natural product cultivation/collections. However, with the modern purification and cultivation technology, natural chemical agents will be much cheaper in the future. There will be a plenty of herbal products for pharmaceutical purposes against cancer and metastasis.

Cancer treatment by herbal medicine is a hot-spot in modern China. Many TCM hospitals in China have a special department of cancer therapeutics. TCM for cancer treatments has been positively reported in China. Generally speaking, current principle of TCM therapies

seeks therapy by expelling Qi-blood stasis in cancer patients. To achieve phlegm-damp syndrome controls, cancer patient symptoms and syndromes may be clinically treated. It is also manifested as survival benefits in cancer patients. Besides symptom ameliorating, TCM can sometimes play decisive roles in cancer treatments.

Future direction

Ideology promotion

The qualities of natural drug developments can be improved by a deeper understanding of herbal medicine practice and theories. The investigation of herbal medicine looks like to translate eastern therapeutic legend into western medical paradigms. Natural chemical drugs are somewhat like gifts from god and we shall pass these gifts down to our future generations. It appears that nature is the greatest medicinal chemist in this very planet.

Genomic study

Apart from general pathway for pathogenesis and therapeutics, new generations of techniques may be borrowed for TCM and natural chemical drug developments, such as cancer genomic study. But these issues face ethical debates and regulatory challenges.

Treatment of neoplasm metastasis

Neoplasm metastasis is a multi-step and multi-level phenotype that is responsible 90% cancer mortality in the clinic [27-32]. More seriously, it has been found that many different states of metastatic cells/cluster (ever-changing character) in wide-ranges of human organs/tissues-now widely known as neoplasm plasticity. A lot of currently-licensed drugs only target narrow-range of these various metastatic states. Nevertheless, TCM is famous for solving whole-body disease and body/organ imbalance. The question of whether TCM can be an alternative solution for neoplasm metastasis is open to us now.

Anti-cancer drug evaluative routine updates

In anticancer drug development, compounds are evaluated from *in vitro* cancer cells to *in vivo* tumor models into human body. However, it may be changed from clinical data to animal tumor models to single or mixture of compounds. By this norm of drug developments, new categories of anticancer drugs may be developed.

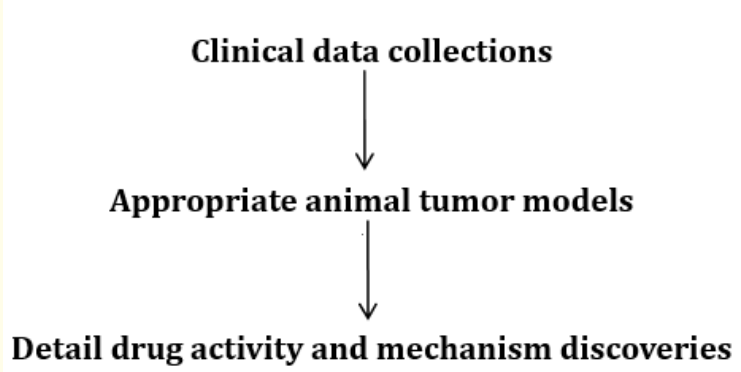

Figure 1: *Anticancer drug discovery from herbal medicine.*

Conclusion

Herbal medicine and natural chemical drugs are interrelated for both basic knowledge and practical custom. A lot of creative ideas and scientific approaches can originate from tradition. As a result, new natural chemical drug developmental system must be established for high-quality and broader-range. To achieve this goal, integration of western and eastern ideas is a top priority and a future direction.

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