• Review

Three advantages of using traditional Chinese medicine to prevent and treat tumor

Chang-quan Ling¹, Xiao-qiang Yue¹, Chen Ling²³

1. Changhai Hospital of Traditional Chinese Medicine, Second Military Medical University, Shanghai 200433, China
2. Division of Cellular and Molecular Therapy, Department of Pediatrics, University of Florida College of Medicine, Gainesville, Florida 32611, USA
3. Powell Gene Therapy Center, University of Florida College of Medicine, Gainesville, Florida 32611, USA

ABSTRACT: Traditional Chinese medicine (TCM), an important component of complementary and alternative medicine, has evolved over thousands of years with its own unique system of theories, diagnostics and therapies. TCM has been increasingly used in the last decades and become well known for its significant role in preventing and treating cancer. We believe that TCM possesses advantages over Western medicine in specific aspects at a certain stage of cancer treatment. Here we summarize the advantages of TCM from three aspects: preventing tumorigenesis; attenuating toxicity and enhancing the treatment effect; and reducing tumor recurrence and metastasis.

KEYWORDS: traditional medicine, Chinese; tumorigenesis; tumor prevention and treatment; tumor recurrence and metastasis

1 Introduction

Traditional Chinese medicine (TCM) was used as an adjuvant therapy to alleviate cancer symptoms at the terminal stages when Western medicine treatments cannot offer any other treatment options. However, recent studies indicate that TCM can play an important role in the whole course of cancer prevention and treatment. The usage and function of TCM varies when dealing with different stages of cancer lesion. Below is a summary of the main strengths of TCM in preventing and treating cancer.

2 Prevention of tumorigenesis

There is no clear consensus on the exact causes of malignant tumors. Factors such as viruses and infections, heredity, psychology, diet, and the environment may all be involved. Consequently, the prevention of tumorigenesis is extremely difficult. The 2000-year-old classical TCM text, *Yellow Emperor’s Internal Cannon* proposed a principle of preventive treatment of disease and formed an integral theoretical system of TCM preventive medicine. TCM theory considers the disease to be caused by a struggle between pathogenic qi and vital qi. If vital qi cannot conquer the pathogen, the disease ensues. In most cases, vital qi is the main factor determining the outcome of the struggle; pathogenic qi usually takes the relatively secondary position. In the struggle between vital qi and the pathogen, if the former is strong, there will be no onset of disease even if the pathogen invades. As stated in *Suwen*, “If vital qi is sufficient inside, the pathogen has no way to invade.” As a result, tonifying vital qi can efficiently reduce the likelihood of disease onset, including cancer. Many Chinese herbs can be taken as natural foods which have the effects of strengthening the spleen, replenishing vital qi, and improving immunity.
They are recommended to populations with high risk of cancer to prevent the disease in varying degrees. For example, Ganfu Jian Granule (also named Ganzao Ning) is composed of three Chinese herbs which can be taken as food (Pericarpium citri reticulatae, Fructus cydoniae, and Rhizoma dioscoreae oppositae). Research showed that it prevented diethylnitrosamine-induced endogenous liver cancer in rats. The study showed that the granule significantly reduced the incidence of liver cancer, alleviated the liver impairment, and inhibited the proliferation activity of hepatocytes in the rats. Specific molecular mechanisms involved the inhibition of c-myc and insulin-like growth factor-1 expression in hepatocytes[3].

Many cancers have precancerous changes, such as the cirrhosis caused by hepatitis B as a precursor to liver cancer; chronic atrophic gastritis with intestinal metaplasia is associated to gastric cancer; severe esophageal epithelial cell hyperplasia is related to esophageal cancer; and vitiligo is related to cutaneous carcinoma. Unfortunately, Western medicine does not have specialized treatment that can address these precancerous changes. However, TCM treatments targeting these precancerous changes are able to stop or even reverse the disease progression and subsequently to prevent carcinogenesis. The TCM treatments adhere to an important TCM principle of preventing the exacerbating of disease and as a result have also gained superiority over Western medicine on the prevention and treatment of cancer. For instance, in the 1980s, a clinical trial was conducted in Lin and Ci Couties in China where high esophageal cancer rates were reported[2]. In this trial, Liuwei Dihuang Pills were given to the patients with atypical hyperplasia and kidney deficiency. The cancer occurrence rate was significantly reduced in the treatment group (8.77%) as compared with that in the control group (25.53%) after 5 years of follow-up[2]. Another clinical trial showed that A-L Tonic Granule is effective in addressing the precancerous disease and chronic atrophic gastritis. In this trial, among the 108 patients with clinical improvement, 47.7% showed improvement in endoscopic examination, and 61.4% had pathologic changes, nearly half of the patients returned to normal status under all the examinations[1]. Recently, Professor Liu’s group[3] explored the underlying molecular mechanism of the TCM preventive treatments. Huangqi Decoction was given to rats with N-nitrosodimethylamine-induced cirrhosis. Liver function and pathology results showed that the rats given the decoction had reduced levels of aspartate aminotransferase and total bilirubin in the serum, less expression of hydroxyproline and α-smooth muscle actin in the liver tissue. Conversely, the number of co-localization cells of thymine 1.1 and cytokeratin 19 was increased, and the phenotype and function of hepatic oval cells were changed. These findings showed that the progression of cirrhosis could be delayed and even reversed. Subsequently, the same group also showed that Fuzheng Huayu Tablet was effective in the treatment of chronic hepatitis B-caused cirrhosis (HBC). Fuzheng Huayu Tablet helped improve the ZHENG score and Child-Pugh score of HBC ($P<0.001$)[6]. At the same time, Gu et al[6] reported that Fuzheng Huayu Capsule could effectively reduce the risk of variceal bleeding and improve survival rates for cirrhotic patients with varices. The combination of the capsule and propranolol presented the best effect. Most importantly, Fuzheng Huayu Capsule could reduce the size of varices in patients with small ones. Its effect may be related to the amelioration of hepatic fibrosis.

3 Attenuating toxicity and enhancing efficacy of allopathy

Surgery, chemotherapy and radiotherapy are three major treatments of allopathy for malignant tumors. Their primary aim is to destroy the tumor. However, normal cells, tissues and their functions are inevitably injured by the allopathy, which disrupt the balance of the human body’s self-regulating system. This not only results in tremendous side effects, but also affects the efficacy of the treatments. For instance, chemotherapy leads to potential gastrointestinal upset, bone marrow inhibition, hypoinnunity and drug-resistance. All of them will dramatically affect the quality of patients’ lives and sometimes force patients to abandon the treatments completely. Consequently, the efficacy of the allopathy would be significantly weakened[7,8]. Western medicine does not have corresponding treatment strategies to alleviate these symptoms although the side effects of the allopathy are known to be problematic. In recent years, TCM has been increasingly used in conjunction with chemotherapy and radiotherapy for the purpose of alleviating and even eliminating the toxic effects of the treatments, as well as of improving overall efficacy. For example, bone marrow inhibition is one of the most common side-effects resulting from chemotherapy and radiotherapy. The Chinese medicine Fufang Ejiao Jiang has been found to dramatically improve the haematopoiesis in mice after chemotherapy and radiotherapy[9]. Bazhen Huaji Decoction can reduce the incidence of gastrointestinal reaction, leucopenia, peritonitis as well as injury to hepatorenal function in patients with oophoroma who received chemotherapy[10]. The effect of four Chinese herbs (Oldenlandia diffusa, Codonopsis tangshen, Rehmannia glutinosa and Astragalus propinquus) on the activity and expression of CYP3A4, which contributes to most of the pharmacokinetic interactions with anticancer drugs, has also been investigated in vitro[11]. Clinically, TCM can improve the efficacy of radiotherapy via extending the survival rate and improving the quality of life. It also has the ability to reduce toxicity of radiotherapy, such as radioactive inflammation, deficiency in leukocytes, and immune dys-function[12]. In recent years, TCM has been recognized as an effective biological response modifier that can modulate the nonspecific immune function of patients with tumors and that can consequently ameliorate bone marrow depression and gastrointestinal tract toxicities induced by
Chemotherapy and radiation\textsuperscript{[11]} Among the comprehensive treatments of liver cancer, transcatheter arterial chemoembolization (TACE) is one of the most important therapies. TCM is effective in prolonging life expectancy, improving immune response, and reducing side effects of TACE in the treatment of liver cancer\textsuperscript{[14]}. Additionally, non-medication therapies such as acupuncture are widely applied in TCM for relieving adverse reactions to chemotherapy or radiotherapy\textsuperscript{[15,17]}. Acupuncture has been shown to have positive effects in cancer treatment in patients who experience side effects from chemotherapy. Statistically significant decreases in pain, nausea, vomiting, insomnia and anxiety scores were observed after the acupuncture treatment as compared to baseline\textsuperscript{[18,19]}.

Some TCM preparations, such as Cinobufacini Injection, Aidi Injection and Shenqi Fuzheng Capsule, have demonstrated positive effects as adjunctive supporting treatments for tumor. They can attenuate the toxic and side effects of allopthy and simultaneously enhance the curative effect\textsuperscript{[20-23]}. Consequently, TCM combined with modern medicine such as chemotherapy and radiotherapy at each stage of treatments may significantly alleviate clinical symptoms, improve quality of life, and prolong life expectancy\textsuperscript{[22]}. This treatment mode not only has significant advantages over using solely modern medicine, but also partakes the increasing trend of multidisciplinary and comprehensive therapy\textsuperscript{[23,24]}

Recent research into the integrated practice of Chinese and Western medicine analyzed the pathogenesis characteristics of toxicity and side effects induced by chemotherapy and radiotherapy based on the basic theory of TCM. They proposed a new idea that radiotherapy is similar to heat toxin, which tends to cause deficiency of qi and yin, while chemotherapy is similar with medicinal toxin which tends to cause deficiency of qi and blood. This idea provides theoretical guidance for TCM clinical medications to reduce toxicity and side effects induced by chemotherapy and radiotherapy\textsuperscript{[25,26]}. At this stage, although TCM only serves as an assistant therapy, using it in conjunction with Western medicine definitely makes for the best possible treatment effects and outcomes.

4 Reducing tumor recurrence and metastasis

Tumor recurrence after surgery is a leading cause of cancer-related death, and is one of the most difficult problems for cancer-related healthcare providers worldwide\textsuperscript{[26]}. Currently, there is no generally accepted therapy for reducing tumor recurrence and metastasis. The renowned liver cancer expert Wu Meng-chao mentioned that TCM and Western medicine stood on the same starting line in this field, and the one which first brought about the innovative therapy for reducing tumor recurrence and metastasis could keep ahead. Important questions including how to utilize the TCM’s ability to strengthen vital qi and eliminate pathogenic qi to improve immunity, to remove residual cancer cells and to prevent tumor recurrence are significant issues worth extensive investigating\textsuperscript{[27]}. Another liver cancer expert, Professor Tang\textsuperscript{[28]} who is devoted to liver cancer investigation has proposed a Chinese cancer treatment model, in which destroying and restructuring are simultaneously emphasized. The model includes removing cancer to the utmost extent (with surgery, radiotherapy, chemotherapy, and/or local treatment) and at the same time modulating the few remaining cancer cells and reforming the constitution of tumor patients (TCM treatment). This treatment mode tries to reverse the cancer cells to normal cells so as to reduce the possibility of metastasis and to make the host body unhospitable for tumor growth. His work showed that modulating cancer cells and the internal environment is one of the advantages of TCM.

Current understanding of TCM mechanisms addressing the recurrence and metastasis after surgery mainly refers to the following aspects: (1) inducing cancer cells apoptosis\textsuperscript{[29]}; (2) changing the intra-connection between cancer cells; (3) inhibiting extracellular matrix degradation\textsuperscript{[30]}; (4) suppressing cancer cells migration\textsuperscript{[31]}; (5) blocking the generation of tumor blood vessels and lymph vessels\textsuperscript{[32]}; (6) enhancing immunological surveillance and regulation\textsuperscript{[33]}; and (7) regulating the tumor microenvironment\textsuperscript{[33,34]}. It is worth noting that because of the complexity of TCM composition, the mechanisms of action in TCM’s prevention of postoperative recurrence and metastasis targets multiple molecular and signal pathways simultaneously. Hence, illustrating or evaluating the mechanism with only one parameter is not conclusive in most cases.

In addition to laboratory research, clinical research has also observed interesting results in the above field: the case-control study of Bufei Xiaoji Decoction in decreasing non-small-cell lung cancer metastasis\textsuperscript{[36]}; the randomized controlled trial of Jianpi Xiaoju Decoction in preventing postoperative recurrence and metastasis of large intestinal cancer\textsuperscript{[37]}; the cohort study of Fuzheng Capsule and Quxie Capsule in reducing the incidence of postoperative recurrence and metastasis of II or III stage large intestinal cancer\textsuperscript{[38]}; the study of Sijunzi Decoction in preventing postoperative recurrence of superficial bladder cancer\textsuperscript{[39]}; the study of qi and blood dual-supply therapy integrated with chemotherapy in preventing recurrence and metastasis from colorectal cancer\textsuperscript{[40]}; and the randomized controlled trial of Jianpi Jiedu Decoction in preventing metastasis after radical operation of gastric cancer\textsuperscript{[41]}. Our institute conducted research from 2006 to 2010 by randomly dividing the patients who had received surgeries for small hepatocellular carcinoma into two groups, one taking TCM herbs while the other TACE. Follow-up at the 3-year period showed significant advantages of using TCM herbs\textsuperscript{[26]}. Professor Xie et al\textsuperscript{[43]} has mentioned that Radix Ginseng and its main components have the effect of preventing tumor recurrence and metastasis.

The results of the clinical studies, especially the recent multicenter randomized controlled studies supported by the National Ministry of Science and Technology, China.
provide convincing evidence that TCM can decrease tumor parameters in meaningful ways.

5 Conclusions

The usage of TCM in cancer treatment, either alone or in conjunction with Western medicine, shows much promise. In both the laboratory and clinic, encouraging accomplishments have been achieved and considerable experience has been accumulated. At this stage, there is no evidence to suggest that TCM can completely cure any malignant tumors. However, we can say that TCM has absolute advantages over Western medicine at certain stage of cancer treatment. Significant research projects for the future should include how to utilize and improve the advantages in practical work and then integrate with modern medical treatments of surgery, radiotherapy, chemotherapy and molecular targeted therapy. Further research should also include how TCM can directly target cancer, and how to maximize treatment effects using integrated medical approach.

6 Competing interests

The authors declare that they have no competing interests.

REFERENCES


22. Guo H, Liu JX, Xu L, Madebo T, Baak JP. Traditional Chinese medicine herbal treatment may have a relevant impact on the prognosis of patients with stage IV adenocarcinoma of the lung treated with platinum-based chemotherapy or combined...
targeted therapy and chemotherapy. Integr Cancer Ther. 2011; 10(2): 127–137.

Submission Guide

*Journal of Integrative Medicine (JIM)* is an international, peer-reviewed, PubMed-indexed journal, publishing papers on all aspects of integrative medicine, such as acupuncture and traditional Chinese medicine, Ayurvedic medicine, herbal medicine, homeopathy, nutrition, chiropractic, mind-body medicine, Taichi, Qigong, meditation, and any other modalities of complementary and alternative medicine (CAM). Article types include reviews, systematic reviews and meta-analyses, randomized controlled and pragmatic trials, translational and patient-centered effectiveness outcome studies, case series and reports, clinical trial protocols, preclinical and basic science studies, papers on methodology and CAM history or education, editorials, global views, commentaries, short communications, book reviews, conference proceedings, and letters to the editor.

- **No submission and page charges**  
- **Quick decision and online first publication**

For information on manuscript preparation and submission, please visit JIM website. Send your postal address by e-mail to jcim@163.com, we will send you a complimentary print issue upon receipt.