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Prevention and Early Diagnosis of Gastric Cancer

Zhiyun Wang¹, Ya Li^{1,2*}

1. College of Medical Technology, Shaanxi University of Chinese Medicine, Xianyang 712046, China.

2. Clinical laboratory center, Xi'an People's Hospital (Xi'an Fourth Hospital), Xi'an 710005, China.

Abstract: Gastric cancer is one of the most common malignant tumors, posing a serious threat to people's life and health. Therefore, prevention and early diagnosis are crucial for managing gastric cancer. This article provides an overview of the research progress in gastric cancer prevention, as well as related serological examinations, tumor markers, and endoscopic techniques. Serological tests and tumor markers are convenient, rapid, and easily accessible screening tools for gastric cancer. However, their sensitivity and specificity are not yet satisfactory and require further improvement. Endoscopic technology offers the advantage of directly observing lesion sites with a high detection rate. When combined with pathologic tissue biopsy, endoscopy serves as a means to confirm the diagnosis of gastric cancer. Nevertheless, it is important to note that endoscopy can be a cumbersome procedure with its detection rate depending on the level of experience of the examiner. Despite these advantages, due to its invasiveness to patients' digestive tracts and potential discomfort during examination procedures leading to patient intolerance towards pain; endoscopy has not been widely adopted as a screening tool for early gastric cancer.

Keywords: Gastric Cancer; Prevention; Early Diagnosis; Serological Examination; Tumor Markers; Endoscopy

Introduction

Gastric cancer is a significant malignant tumor that poses a threat to the health of Chinese people and the lives of cancer patients in China and worldwide. It ranks fifth in terms of incidence rate and fourth in terms of mortality rate among global cancers. According to data from the World Health Organization (WHO), there were over 1 million new cases of gastric cancer worldwide in 2020, with 479,000 cases occurring in China, accounting for 44% of global cases. The estimated global death cases from gastric cancer in 2020 are 769,000, with China accounting for 374,000 cases, or 48.6%^[1]. The early diagnosis and prevention of gastric cancer are crucial for both healthy individuals and patients due to its lack of obvious symptoms in the early stages leading to advanced stages upon diagnosis. Patients who undergo radical surgery combined with chemotherapy can achieve a 5-year survival rate as high as 90%^[2]. This paper aims to review strategies for preventing and diagnosing gastric cancer at an early stage.

1 Gastric cancer prevention

1.1 Cigarette smoking

Smoking is a well-established risk factor for gastric cancer. In 2002, the International Agency for Research on Cancer (IARC) identified smoking as one of the causative factors for gastric cancer^[3]. It has been observed that smoking increases the risk of developing gastric cancer, even in individuals who are negative for H. pylori infection. The risk is highest in smokers who are positive for H. pylori, as smoking can lead to more severe H. pylori infection^[4]. A prospective study conducted in China, which involved 18,244 men, found that smokers had a significantly higher risk of developing gastric cancer^[5].

1.2 Diet

The stomach is an essential organ within the digestive system. Maintaining a healthy diet can effectively reduce the risk of developing stomach cancer, whereas excessive consumption of high-salt and alcohol may significantly increase this risk^[6]. Research studies have indicated that both high salt intake and frequent consumption of pickled foods are associated with an elevated risk of stomach cancer^[7]. Furthermore, alcohol has been identified as a significant risk factor for gastric cancer. A cohort study conducted in Japan revealed that alcohol consumption was linked to an increased risk of gastric cancer among Japanese men^[8].

1.3 Helicobacter pylori

Helicobacter pylori, the only bacterium capable of surviving in the stomach, is a gram-negative bacillus. In 1994, the World Health Organization classified Helicobacter pylori as a group I carcinogen. It has been demonstrated that Helicobacter pylori is associated with the development of various gastric diseases, including gastric cancer^[9]. Studies have shown that eradicating H. pylori in mice can reduce gastric mucosal inflammation and prevent its progression to gastric cancer^[10]. In human patients, the incidence of gastric cancer in those treated with H. pylori eradication is lower than in untreated patients, indicating that H. pylori eradication can reduce the occurrence of gastric cancer to some extent^[11]. Convenient and rapid testing for H. pylori can help to some extent in preventing gastric cancer.

2 Serological examination

2.1 Serum pepsinogen test(PG)

Pepsinogen can be categorized into pepsinogen I and pepsinogen II. The former is secreted by the mucus neck cells and principal cells of the acid-secreting glands, while the latter can also be secreted by the cardia glands and the pyloric glands of the gastric sinus section. Therefore, the level of pepsinogen detection reflects the normal physiological function of the stomach. A study has indicated that in 116 patients suspected to have gastric cancer based on endoscopic examination, both PG I and PG I/II ratios were significantly decreased in gastric cancer patients^[12]. This decrease may be attributed to atrophy of the gastric mucosa as the disease progresses in gastric cancer patients, leading to a reduction in pepsinogen levels. Due to its non-invasive nature, rapid results, and relatively low cost, serum pepsinogen testing can serve as a screening tool for gastric cancer to some extent.

2.2 Serum gastrin-17

Gastrin is a crucial hormone in the digestive system, primarily synthesized and secreted by gastric G cells in the gastric antrum, with 90% of it being gastrin-17. Gastrin-17 reflects the secretion function of the gastric mucosa and is closely associated with the physiological function of the stomach. A study conducted by some scholars compared 122 patients with gastric cancer (gastric cancer group) to 65 patients with benign gastric diseases (control group). The study observed differences in levels of gastrin-17, pepsinogen, and glycoconjugate antigen 72-4 (CA72-4) between the two groups. The findings revealed that levels of gastrin-17 and pepsinogen were significantly lower in patients with gastric cancer compared to those in the control group, while CA72-4 levels were notably higher. This suggests that serum gastrin-17 can be beneficial for detecting gastric cancer. Additionally, combining tests can enhance sensitivity and specificity for detecting this condition^[13].

3 Tumour markers

Tumor markers are substances present in tumor cells or secreted by tumor cells, and they hold great significance for the diagnosis of tumors, making them a current focus of research. Some studies have observed that young patients with early gastric cancer show significantly higher positive rates of anti-Helicobacter pylori antibodies, CA72-4, CA199, and CEA compared to patients with gastritis and healthy individuals. This suggests that tumor markers have potential value as an auxiliary tool for the early diagnosis of gastric cancer^[14]. Tumor markers related to gastric cancer include carcinoembryonic antigen (CEA), glycoconjugate antigen 724 (CA-724), and glycoconjugate antigen 199 (CA-199). However, these tumor markers lack specificity for gastric cancer, and their individual sensitivity is not satisfactory. Yu et al. developed a recommendation system for screening gastric cancer using serum CEA, CA72-4, and CA199. They improved the effectiveness of the tumor marker test by categorizing patients with suspected gastric cancer based on grading criteria. This approach was found to be significantly better than individual testing in case observation and detection, providing a new perspective for detecting early gastric cancer using tumor markers^[15].

3.1 MicroRNA

MicroRNA (miRNA), a non-coding single-stranded RNA molecule, has been shown to be associated with dysregulated expression of

miRNAs in a variety of diseases, including cancer. Serum miRNAs have the potential to serve as biomarkers for the detection of various cancers and other diseases^[16]. MiRNA exists in a stable state in human plasma and is not affected by endogenous RNA enzymes^[17]. Some scholars utilized real-time fluorescence quantitative PCR to detect differences in various miRNAs between gastric cancer patients and normal subjects. The results indicated that the expression of certain miRNAs in gastric cancer patients was significantly higher than that in normal subjects^[18]. Additionally, Huang et al. conducted real-time fluorescence quantitative PCR on samples from 24 gastric cancer patients and 20 healthy individuals to detect the expression of miRNA-21-5p, miRNA-2-3p, and miRNA-29c-3p. They found that the level of miRNA-21 was significantly up-regulated in gastric cancer patients, while the levels of miRNA-22miRNA-29 were down-regulated^[19]. Furthermore, some scholars observed the expression of serum miRNAs in 578 cases of gastric cancers and healthy controls. They screened 68 miRNAs related to gastric cancer and subsequently established a 12-miRNA assay for gastric cancer. This assay was found to be sensitive and specific compared to pepsinogen, CEA, and CA199 in subsequent validation experiments, providing a new approach for detecting gastric cancer^[20]. In conclusion, it is anticipated that microRNA will become a novel tumor marker for diagnosing gastric cancer.

3.2 Long-stranded non-coding RNAs (lncRNAs)

Long-stranded non-coding RNAs (lncRNAs) are defined as RNAs with a nucleotide length greater than 200. Several studies have demonstrated that lncRNAs play a regulatory role in gene expression at various levels, including transcriptional, post-transcriptional, and epigenetic regulation. In the context of gastric cancer, certain long-stranded non-coding RNAs have been found to be associated with tumor size, macroscopic type, histological grading, tumor invasion, and metastasis^[21]. For example, one study investigated the association between H19 (a specific lncRNA) levels and gastric cancer by detecting its presence in patients. The results showed that H19 levels were significantly higher in gastric cancer patients compared to healthy individuals^[22]. Furthermore, other researchers found that circulating H19 levels were elevated in gastric cancer patients compared to normal individuals. Additionally, they observed that plasma H19 levels were higher in patients with smaller tumors than those with larger tumors and also higher in patients with T1-T2 staging compared to those with T3-T4 staging. Moreover, H19 levels were found to be greater in patients without lymph node metastasis compared to those with lymph node metastasis^[23]. These findings suggest that high levels of long-stranded non-coding RNA may serve as potential biomarkers for early detection of gastric cancer.

3.3 Cell-free DNA cfDNA

Cell-free DNA (cfDNA) is a fragmented form of DNA that circulates freely in body fluids, such as blood. Studies have shown that the concentration of cfDNA in gastric cancer patients differs significantly from that in patients with benign gastric diseases and healthy adults. Furthermore, it has been found that the sensitivity of cfDNA for detecting gastric cancer is superior to that of traditional biomarkers such as CEA, CA199, and CA72-4. These findings suggest that cfDNA may hold potential for improved detection of gastric cancer^[24]. Additionally, researchers have utilized Alu81-qPCR to measure plasma cfDNA levels in 54 gastric cancer patients and 59 healthy individuals. The results revealed significantly higher levels of cfDNA in the plasma of gastric cancer patients compared to those of healthy individuals^[25]. The observed differences in cfDNA levels between gastric cancer patients and normal subjects indicate that cfDNA could serve as an adjunctive tool for detecting gastric cancer to a certain extent.

4 Endoscopy

4.1 White light endoscopy

Plain white light endoscopy combined with pathological tissue biopsy is a crucial method for diagnosing gastric cancer. This approach allows the examiner to directly observe abnormal areas of the gastric mucosa and obtain samples for pathological biopsy. While plain white light endoscopy is an important tool for diagnosing gastric cancer, its effectiveness depends on the experience and skill level of the examiner, which may result in missed diagnoses of early-stage gastric cancer. Nevertheless, this does not diminish the value of ordinary white light endoscopy as a screening tool for gastric cancer. In addition, more advanced endoscopic techniques such as magnifying endoscopy combined

with narrow-band imaging and pigmented endoscopy can be utilized to improve the detection rate of suspicious lesions that cannot be diagnosed using plain white light endoscopy^[26].

4.2 Magnifying endoscope

Magnifying endoscopy has the capability to magnify the gastric mucosal tissue and microvessels by dozens or even hundreds of times. This feature makes it more conducive for observing gastric mucosal morphology and subtle changes compared to ordinary white light endoscopy. As a result, it improves the detection rate of early gastric cancer, particularly in cases where there are inconspicuous changes in the early stage of gastric mucosa. Additionally, magnifying endoscopy can be combined with endoscopic narrow-band imaging technology, which utilizes narrow-band filters instead of traditional broad-band filters. This technology takes advantage of the difference in penetration depth of different wavelengths of light to better observe the epithelium and blood vessels of digestive tract mucosa. This approach is also known as electron-stained endoscopy, making magnifying endoscopy an effective means for detecting early gastric cancer^[27].

4.3 Pigmented endoscope

Chromoendoscopy involves staining the gastric mucosa with a staining agent and then observing it using endoscopy. Commonly used staining agents include indigo carmine, American blue, Congo red, acetic acid, and others. Gastrointestinal metaplasia is a pathological change that is associated with the development of gastric cancer. Some scholars have compared the detection rate of gastrointestinal metaplasia in patients with dyspepsia symptoms using ordinary white light endoscopy versus pigmented endoscopy combined with narrow-band imaging. They found that the detection rate of pigmented endoscopy combined with narrow-band imaging is significantly better than that of ordinary white light endoscopy alone. This method helps to detect cases that may be missed by ordinary white light endoscopy and is considered a more reliable means of examination^[28,29].

4.4 Blue laser imaging technology

Blue laser imaging is an image-enhanced endoscopic technique that utilizes a laser light source to observe microvessels and microstructures in the superficial layer of the gastric mucosa. Its observation effect on the microvessels and microstructures of the gastric mucosa is comparable to that of magnified endoscopy combined with narrow-band imaging^[30]. A study conducted by Japanese scholars, involving 530 patients, found that the sensitivity of blue laser imaging technology increased by 46.9%, specificity by 11.6%, and accuracy by 20.4% compared with ordinary white light endoscopy. This indicates that blue laser imaging technology can enhance the diagnostic effectiveness for early gastric cancer^[31].

4.5 Confocal laser microendoscopy

Confocal laser microendoscopy is a combination of endoscopy and laboratory confocal microscopy, which can magnify the image of the gastric mucosa up to a thousand times, allowing direct observation of the cellular level of the gastric mucosa. Gong et al.^[32] conducted plain white light endoscopy, magnifying endoscopy combined with narrow band imaging, and confocal laser microscopy for 82 patients. The sensitivity, specificity, and accuracy of confocal laser microscopy were found to be 90%, 93.48%, and 91.86% respectively, comparable to magnifying endoscopy combined with narrow band imaging. Confocal laser microendoscopy was observed to provide real-time assessment of the gastric mucosa, facilitating the identification of tumor and non-tumor tissues^[33].

4.6 Capsule endoscopy

Capsule endoscopy is an emerging technology for visualizing lesions in the gastrointestinal tract. It involves orally ingesting a miniature camera shaped like a capsule^[34]. Through continuous research and development, magnetically controlled capsule gastroscopy has been introduced. In comparison to traditional capsule endoscopy, the examiner is able to manipulate the movement and direction of the magnetically controlled capsule gastroscope within the body in order to purposefully observe local lesions. Several studies have demonstrated that

magnetically controlled capsule gastroscopy is more effective in examining gastric lesions^[35]. It is less invasive than traditional endoscopy, causes less discomfort for patients, and has become a crucial examination modality for gastrointestinal diseases.

5 Conclusion

Primary prevention of cancer involves the intervention and control of causative factors and risk factors before the occurrence of cancer^[36]. For the general population, it is crucial to focus on preventing gastric cancer by addressing risk factors such as smoking, high salt diet, alcohol consumption, and *Helicobacter pylori* infection. *Helicobacter pylori* is a type of G-bacillus that can survive in the gastric mucosa and has a close association with the development of gastric diseases including gastritis, gastric ulcers, and gastric cancer. Detecting and eradicating *Helicobacter pylori* can help to some extent in preventing gastric cancer^[37]. In patients with gastric cancer, the timing of treatment significantly impacts their survival and prognosis. Therefore, early diagnosis of gastric cancer is particularly important^[38]. This paper provides a review of serological examination, tumor markers, and endoscopic techniques for early diagnosis of gastric cancer. Among them, pepsinogen and serum gastrin-17 are secreted by the digestive tract and are closely related to the physiological function of the stomach. They play a certain auxiliary role in the early diagnosis of gastric cancer^[39,40]. Tumor markers are currently a research hotspot and have good prospects for the early diagnosis of gastric cancer^[41]. The advantages of these methods, including convenience, speed, affordability, and patient acceptance, make them potential screening tools. However, they can only assist in the early diagnosis of gastric cancer and their sensitivity and specificity are not ideal. Therefore, they cannot be used as a means to confirm the diagnosis of early gastric cancer. Although combined testing can partially address issues with sensitivity and specificity, it is still necessary to find tumor markers with better sensitivity and specificity. Endoscopy has always been an important diagnostic tool for gastric cancer. Endoscopy combined with pathologic tissue biopsy forms an important basis for diagnosing gastric cancer^[42]. With continuous advancements in science and technology, new endoscopic techniques such as magnifying endoscopy combined with narrowband imaging technology, pigment endoscopy, and confocal laser microendoscopy have significantly improved the detection rate of early gastric cancer^[43]. However, due to its invasiveness and patient tolerance issues, endoscopy cannot be used as a screening tool for early gastric cancer. While magnetic capsule endoscopy reduces patient discomfort during examination significantly compared to traditional techniques; its detection rate is not as high as that of traditional endoscopic techniques; furthermore it lacks capability for pathological sampling which remains unresolved.

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Latest Advances In Geriatric Care: Enhancing Quality Of Life For Older Adults

Bing Yu

Silliman University, Hibbard Hall' Dumaguete City, Negros Oriental. 6200, Philippines.

Abstract: Latest advancements in elderly care aim to improve quality of life for older adults. Interactive technology and remote medical care enhance socialization and entertainment, and facilitate remote diagnosis and monitoring. Professional training and nursing talent cultivation equip caregivers with advanced skills and improve communication and collaboration. Policy intensification and societal support improve living conditions and resources for healthy aging. Evaluating implementation effectiveness and future research directions will optimize caregiving, further enhancing older adults' quality of life. These advancements provide comprehensive, compassionate care, fostering continuous development and innovation in elderly care.

Keywords: Elderly Care; Quality Of Life; Senior Citizens

Introduction

With the accelerated global aging trend, the number of elderly individuals is continuously increasing. Older adults are valuable resources in society, and enhancing their quality of life has become a significant challenge for countries worldwide. Older adults face various specific needs and challenges, such as physical health issues, mental health problems, and caregiving requirements. Therefore, the latest advancements in elderly care are of great significance in improving the quality of life for older adults.

This article aims to provide an overview of the latest developments in elderly care to explore how to enhance the quality of life for older adults. Firstly, we will define and measure the quality of life for older adults, emphasizing its importance. Secondly, we will examine the impact of mental health and social support on the quality of life for older adults, along with corresponding intervention measures^[1]. We will then discuss the importance of nutrition and healthy diets for older adults and explore the promotion and intervention strategies for healthy eating. Additionally, we will explore the influence of physical activity and exercise on the quality of life for older adults and propose relevant strategies and interventions. Furthermore, we will study chronic disease management, caregiving services, and long-term care to better meet the special needs of older adults. In terms of technological innovations, we will discuss the applications and future trends of interactive technology and remote medical care in elderly care. Furthermore, we will emphasize the importance of professional training and nursing talent and explore career development pathways for healthcare providers. Finally, we will discuss the role of policies and social support in enhancing the quality of life for older adults and outline future research directions.

1. Quality of life for the elderly

The quality of life for the elderly refers to their satisfaction and sense of happiness in various aspects such as physical, mental, and social well-being. With the increasing population of the elderly and the trend of aging, improving the quality of life for the elderly has become an important issue in countries worldwide. This is because the quality of life for the elderly is crucial to their own sense of happiness and satisfaction, and also has a profound impact on social development and the allocation of medical resources.

The quality of life for the elderly is influenced by many factors. Firstly, physical health is an important component of the elderly's quality of life. The elderly often face chronic diseases, functional decline, and pain, which can affect their quality of life. Secondly, mental health is also a key factor in the quality of life for the elderly^[2]. The elderly may face psychological issues such as depression, anxiety, and cognitive decline, which can have a negative impact on their sense of happiness. In addition, social interaction and social support are also important aspects of the quality of life for the elderly. The social network, community involvement, and feelings of loneliness among the elderly can all affect their quality of life. Lastly, the living environment is also an important factor that affects the quality of life for the elderly. This includes housing conditions, transportation convenience, community facilities, etc.

In order to improve the quality of life for the elderly, a series of strategies and measures need to be taken. Firstly, promoting physical health is crucial. Measures such as regular check-ups, chronic disease management, and pain management can improve the physical health of the elderly. Secondly, support for mental health is also essential. Providing psychological counseling, cognitive-behavioral therapy, and social support services can improve the mental health of the elderly. In addition, social interaction and community involvement are also important strategies. Encouraging the elderly to participate in community activities, volunteer services, and elderly clubs can enhance their social interaction and community involvement. Health education and behavioral interventions are another important aspect. Measures such as nutritional guidance, promotion of physical exercise, and education on rational use of medication can help the elderly develop healthy habits. Furthermore, improving the living environment for the elderly is also an important approach to enhancing their quality of life. Building age-friendly communities, developing long-term care facilities, and improving transportation convenience for the elderly can all improve their living environment.

2. Mental health and social support

Mental health and social support are crucial for elderly care. Elderly individuals often face mental health issues such as depression, anxiety, and insomnia. To address these, various strategies have been implemented. They can seek professional psychological help through counseling and therapy, which helps them understand and cope with their emotional problems. Additionally, social support is essential. Engaging in social activities and interactions helps them establish connections, reducing feelings of loneliness and depression. Technologies like social media also enable them to stay connected with loved ones^[3], sharing joys and challenges. These advancements in mental health and social support enhance the elderly's quality of life, promoting happiness and satisfaction.

3. Nutrition and healthy diet

The importance of nutrition and a healthy diet in elderly care cannot be overstated. As individuals age, they are more prone to malnutrition and health issues, making a scientific and balanced diet crucial for their well-being. Recent research indicates that older adults should consume adequate amounts of protein, vitamins, minerals, and dietary fiber to support their body functions and immune system. To meet the nutritional needs of the elderly, various dietary plans and nutritional supplements have been introduced in elderly care.

The design of dietary plans for the elderly aims to provide high-protein, low-sodium, low-fat, and high-fiber foods to help them maintain a healthy weight and blood pressure level. Protein is an essential element for maintaining the health of older adults, as it helps support bone health, muscle function, and immune function. Protein sources can include lean meats, fish, eggs, legumes, and dairy products, among others. Additionally, older adults also need adequate intake of vitamins and minerals such as vitamin B12, vitamin D, calcium, and iron, which contribute to the health of the nervous system, bones, and red blood cells^[4]. Dietary fiber is crucial for digestive system function and cardiovascular health in older adults, and can be obtained through fresh vegetables, fruits, whole grain foods, and legumes.

In addition to a well-designed dietary plan, older adults should also maintain an adequate intake of water. Water plays a vital role in the health and metabolism of the elderly, particularly in preventing dehydration and fatigue. Older adults often experience a decrease in their water intake due to changes in their sense of smell and taste perception. Therefore, the importance of hydration is emphasized in elderly care, encouraging older adults to maintain their bodily water levels by drinking sufficient water, consuming fruit juices, and consuming water-rich foods.

The latest advancements in nutrition and healthy diet provide older adults with more options to maintain their health and improve their quality of life. Scientific dietary plans and nutritional supplements help older adults meet their nutritional needs, supporting their body functions and immune system health. Additionally, specific nutritional supplements can help older adults maintain bone health and immunity, such as vitamin D and calcium. Adequate water intake is equally important for the physical health of older adults, as it helps maintain hydration, prevents dehydration and fatigue, and ultimately enhances their quality of life.

However, the implementation of nutrition and healthy diet in elderly care still faces some challenges. Firstly, older adults often experience decreased appetite and difficulty eating, leading to inadequate nutrient intake. Coupled with their food preferences and changes in taste, this can result in insufficient intake of certain nutrients. Secondly, older adults often face limitations due to economic and social factors,

which may prevent them from accessing a balanced diet. Additionally, older adults often face multiple medical conditions and medication treatments, which can affect their dietary intake and nutrient absorption.

To address these challenges, measures can be taken in elderly care to promote nutrition and healthy diet. Firstly, providing affordable nutritious meals and dietary guidance can help older adults meet their nutritional needs. Secondly, enhancing nutrition promotion and education for older adults can increase their awareness and knowledge of nutrition and healthy diet. Additionally, the involvement of family members and caregivers plays an important role in providing support and supervision to ensure that older adults have access to a balanced diet.

4. Exercise and physical activity

Exercise and physical activity are crucial for elderly care, aiming to enhance their quality of life. Research shows moderate exercise benefits their physical and mental health. Specialized exercise programs combine various training methods to meet seniors' diverse needs, including endurance, strength, balance, and flexibility training. These activities, like walking, cycling, weightlifting, yoga, and stretching, improve cardiorespiratory function, strengthen muscles and bones, enhance balance, and reduce fall risks. However, exercise plans must consider individuals' conditions, goals, and health status, emphasizing safety and individualization.^[5] When implementing exercise plans, older adults should follow the principle of moderation, gradually increasing exercise intensity and duration to avoid the risks of vigorous exercise and overtraining.

5. Chronic disease management

Chronic disease management is an important component of elderly care, aiming to improve the quality of life for older adults. As individuals age, they are more susceptible to chronic diseases such as hypertension, diabetes, heart disease, and arthritis. These chronic diseases often require long-term treatment and management to control disease progression and alleviate symptoms.

The latest research and practices have shown that chronic disease management in elderly care requires a comprehensive and individualized approach. Firstly, the management of chronic diseases in older adults needs to be based on a proactive lifestyle. Through a healthy diet, moderate exercise, sufficient sleep, and stress management, older adults can improve their physical condition, control disease progression, and alleviate symptoms. Secondly, regular health checks and medical management are necessary for older adults. This includes regular follow-ups, monitoring disease progression, and adjusting treatment plans. Older adults also need to take medications as prescribed by their doctors and understand the side effects and interactions of the medications. Additionally, older adults can benefit from participating in chronic disease management training and support groups, gaining more knowledge and skills in managing chronic diseases, as well as sharing experiences and support with other patients.

The latest advancements also include technology-based tools for chronic disease management. For example, smartphone applications and health monitoring devices can help older adults track their health data such as blood pressure, blood sugar, and heart rate, as well as remind them to take medications and engage in health management. These tools enable older adults to have a better understanding of their health status and facilitate closer communication and collaboration with healthcare teams.

6. Implementation effectiveness evaluation and future research directions

Through implementation effectiveness evaluation and exploration of future research directions, the field of geriatric care can continuously optimize and improve nursing services, further enhance the quality of life for the elderly, and create a healthier and happier aging society.

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The Synergistic Effect Of Lutein With Blue Light Filtration In The Eye Health Of Electronic Device Users

Yongshuai Zhang¹, Ying Li²

1.Nursing and Health College of Xinjiang Applied Vocational and Technical College, Kuitun City, Xinjiang Province 833200, China.

2.Xuzhou Medical University affiliated Xuzhou Municipal Hospital , Xuzhou 221006, Jiangsu, China.

Abstract: This article delves into the synergistic role of lutein and blue light filtration technology in the eye health of electronic device users. The potential effects of electronic device use on eye health are first described, including the nature of blue light, vision problems caused by long-term use, and research related to vision deterioration. Secondly, the mechanism of action of lutein, including its distribution and function in the eye, as well as its filtering effect on blue light, is elaborated, and how lutein can reduce the negative effects of electronic screen use is discussed. Subsequently, the principle, application and effect of blue light filtering technology on reducing eye fatigue were analyzed, and some limitations and challenges of this technology were pointed out. The final section discusses the synergistic effects of lutein and blue light filtering technology, including how the two work together, the effect of synergies on improving vision protection, and practical application suggestions and strategies. Through the comprehensive analysis of these contents, this paper aims to provide scientific eye protection suggestions for users of electronic devices and promote the comprehensive management of eye health.

Keywords: Lutein; Blue Light Filtering; Electronic Equipment; Eye Health; Vision Protection

Introduction

With the rapid development of modern technology, electronic devices have become an indispensable tool in people's daily life. However, prolonged use of electronic devices can pose a potential threat to eye health, especially the blue light emitted by electronic screens. This article aims to explore the positive effects of lutein and blue light filtration technologies on eye health in synergy through an in-depth study of their synergistic effects, and to provide scientific eye protection recommendations for the public to maintain vision health.

1. The impact of electronic device use on eye health

1.1 The nature of blue light on electronic screens and its effects on the eyes

With the popularity of electronic devices, people are exposed to electronic screens for a long time in their daily lives, which contain the emitted blue light. Blue light has a higher energy and a shorter wavelength, giving it a strong penetrating power. Prolonged exposure to blue light emitted by electronic screens can trigger a range of eye irritation. These symptoms include eye strain, dryness, blurred vision, etc., which can affect an individual's daily life and productivity. In addition, the strong penetration of blue light can also cause potential damage to the retina of the eye ^[1].

1.2 Visual problems with long-term use of electronic devices

Research has shown that long-term use of electronic devices is strongly associated with a range of vision-related problems. Among them, the most prominent problem is the increase in the incidence of myopia. Prolonged staring at an electronic screen may lead to excessive tension in the eye muscles, which in turn affects the eye's ability to focus, thus contributing to the occurrence of myopia. In addition, frequent use of electronic devices can also lead to symptoms such as eye strain, eye discomfort, and negative impact on an individual's eye health.

1.3 Research on the use of electronic devices and vision deterioration

Studies in recent years have shown that excessive use of electronic devices may be associated with a gradual deterioration of vision.

Especially in the group of children and adolescents, the overuse of electronic devices is considered to be an important factor in the rising incidence of myopia. This has led to in-depth research into the relationship between electronic device use and vision health in search of effective prevention and interventions^[2].

2. The mechanism of action of lutein and its protective effect on the eyes

2.1 Distribution and function of lutein in the eye

The antioxidant effects of lutein in the eye are achieved by neutralizing and scavenging free radicals produced in the eye. Free radicals are unstable molecules produced due to light-induced oxidation reactions that tend to cause damage to the cellular structure and membranes of the eye. Lutein acts as a powerful antioxidant that traps these free radicals, preventing them from causing further damage to the eyes. This antioxidant effect helps to maintain the normal functioning of the visual system, slowing down the aging process of the eye while reducing eye discomfort caused by oxidative stress. Secondly, the optical barrier formed by lutein in the retina is achieved through its special molecular structure. Lutein molecules are able to absorb a portion of blue light under the action of light and convert it into non-damaging heat energy. This filtering reduces the intensity of blue light, mitigating its direct impact on eye tissue. Especially in the blue light emitted by electronic screens, this optical barrier plays an important role in relieving eye fatigue and reducing glare, providing a more comfortable visual environment for the eyes. In addition, lutein is involved in the signaling process of photoreceptors in the retina through its interaction with substances such as retinol. This modulation helps to maintain the steady state of the photoreceptors and improve their ability to perceive light. By optimizing the working state of photoreceptors, lutein can enhance the perception of external light and improve visual clarity, which is beneficial for maintaining good visual function.

2.2 Lutein's filtering effect on blue light

The molecular structure of lutein makes it a superior compound for absorbing blue light. Blue light belongs to the shorter wavelength of light in the spectrum, while the lutein molecule has a special - conjugated structure, which allows it to effectively absorb the shorter wavelength spectrum, especially blue light. This property allows lutein to act in the eye like a natural light filter, selectively absorbing and mitigating the intensity of blue light, reducing its direct irritation to the eye. The optical barrier formed by lutein in the retina is achieved by its accumulation in the macular region. This macular region has a higher concentration of lutein, allowing it to partially absorb and filter out blue light as it passes through the eye and into the retina. This barrier effect reduces the penetration depth of blue light and mitigates its impact on the deep tissues of the eye, thereby alleviating the eye problems caused by blue light to a certain extent. Lutein's blue light filtering effect is particularly critical for protecting retinal cells. Retinal cells are highly sensitive to blue light, and excessive exposure to blue light may trigger oxidative damage to retinal cells. Lutein effectively slows down potential cell damage by absorbing blue light and reducing its concentration in the retina, helping to maintain the health of the retina.

2.3 How lutein can reduce the effects of electronic screen use

Lutein effectively reduces the irritation of the eyes from the blue light released by electronic screens through its blue light filtering properties. When using electronic devices for a long time, the eyes are exposed to strong blue light, which can easily lead to problems such as eye fatigue and blurred vision. Lutein acts as a natural blue light filter in the eye, relieving the direct irritation of blue light to the eye by absorbing and filtering part of the blue light, thereby relieving eye fatigue and improving visual clarity and comfort. The antioxidant effects of lutein are essential for slowing down the eye aging process caused by electronic screen use. The light emitted by electronic devices contains harmful ultraviolet and blue light, which can cause oxidative damage to the eye tissue, which in turn accelerates the aging of the eye. Lutein effectively alleviates the adverse effects of oxidative stress on the structure and function of the eye by neutralizing and scavenging free radicals, helping to maintain the normal functioning of the eye and delaying the aging process of the eye. The presence of lutein also improves the eye's adaptability to changes in light. During the switch from a bright environment to an electronic screen, the eyes need to adjust to sud-

den changes in light, which can lead to eye discomfort. Lutein optimizes the working state of photoreceptors, making it easier for the eyes to adapt to light of different brightness, reducing the probability of ocular discomfort and further improving visual comfort^[3].

3. Blue light filtering technology and its effect on eye protection

3.1 The principle and application of blue light filtering technology

The principle of blue light filtering technology is mainly based on the concept of optical filtering. Blue light belongs to the light with a shorter wavelength in the spectrum, and blue light filtering technology aims to reduce or filter out a part of the blue light through a special filter material or coating, thereby slowing down the irritation of blue light to the eyes. These filter materials are typically designed to absorb or reflect only light in a specific wavelength range to retain transmission to other wavelengths and ensure that the overall visual quality is not compromised. In terms of applications, blue light filtering technology is widely used in eyeglasses, screen protectors, and other optical devices. Blue light filtering lenses on glasses are usually made of special optical materials that have the property of selectively filtering blue light. These lenses can be attached to regular glasses to provide the user with additional protection against blue light filtering. Screen protectors reduce the amount of blue light released to the user's eyes by adding a blue light filter layer to the surface of the screen of electronic devices, thereby reducing the occurrence of eye strain. The application of blue light filtering technology in eye care can not only reduce eye strain, but also help reduce the potential damage of blue light to the retina. However, it is important to note that blue light filtration technology is not a one-and-done solution, and its effectiveness may vary depending on the material, design, and manufacturing process. When using blue light filter products, users should choose reliable brands and products to ensure that they meet quality standards and are used correctly to achieve the best eye protection.

3.2 The effect of blue light filtration on reducing eye fatigue

Reduces eye strain. Prolonged exposure to blue light emitted by electronic devices can easily lead to eye fatigue, which manifests as symptoms such as dry eyes, astringent eyes, and blurred vision. Blue light filtering technology reduces the irritation of light to the eyes by attenuating the intensity of blue light, thereby reducing the visual fatigue of the eyes and making users more comfortable when using electronic devices. Improves sleep quality. Prolonged exposure to blue light emitted by electronic screens, especially at night, may interfere with the body's biological clock and inhibit the secretion of melatonin, thereby affecting the quality of sleep. Blue light filtering technology helps to reduce blue light exposure before and after using electronic devices, alleviates disturbances to the biological clock, helps improve sleep quality, and reduces sleep problems caused by eye strain. Blue light filtering technology also helps to reduce the feeling of dryness in the eyes. Blue light can cause water to evaporate in the eyes, causing dryness and discomfort in the eyes. By reducing the intensity of blue light, blue light filtering technology helps to keep the eyes moisturized and reduces the symptoms of dry eyes.

3.3 Limitations and challenges of blue light filtration technology

Blue light filtering technology is not suitable for all situations. Some studies have noted that normal blue light has a positive effect on the circadian clock and daytime alertness, so moderate exposure to blue light during the day is beneficial. Over-filtering of blue light can affect normal biorhythms, leading to problems such as poor daytime attention and difficulty falling asleep at night. Therefore, when using blue light filtering technology, it is necessary to weigh its impact on daily life and sleep quality. The effectiveness of blue light filtering technology varies depending on product quality and design differences. There are a variety of blue light filtration products on the market, with varying quality and results. Some products may filter blue light only in a specific wavelength range and have less of an impact on other spectral ranges. Therefore, it is crucial to choose a high-quality, certified product to ensure that it can provide effective eye protection. Blue light filtering technology does not solve all eye problems associated with the use of electronic devices. In addition to being associated with blue light exposure, eye fatigue can also be affected by a variety of factors such as eye habits, work environment, screen brightness, etc. Therefore, blue light filtering technology should be considered as part of eye care rather than the only solution^[4].

4. Fourth, the synergistic effect of lutein and blue light filtration

4.1 How lutein works with blue light filtration technology

The blue light filtering effect of lutein is complemented by the blue light filtering technology. The mechanism by which lutein forms an optical barrier in the eye is mainly through its molecular structure, which has the ability to absorb blue light. This property allows lutein to act as a natural blue light filter, mitigating direct irritation of blue light to the eyes by capturing and filtering some of it. Blue light filtering technology can also effectively reduce the transmission of blue light by adding a special filter layer to the glasses or screen protector, further reducing the impact of blue light on the eyes. This dual protection strategy works synergistically in providing more comprehensive protection against blue light, helping to reduce eye fatigue and maintain visual comfort. The antioxidant effect of lutein works synergistically with blue light filtration technology to prevent oxidative damage in the eye. The blue light emitted by electronic devices contains harmful ultraviolet and blue light that can cause oxidative damage to the eye tissues. Lutein mitigates eye damage from oxidative stress by trapping free radicals, which are normally caused by light. Blue light filtration technology reduces the likelihood of blue light-induced oxidative damage, and by reducing the amount of time the eye is exposed to harmful spectrum, the two work together to reduce oxidative stress on eye cells, helping to maintain the normal structure and function of the eye. Both lutein and blue light filtering technologies improve the eye's adaptability to light. Lutein enhances the perception of external light by regulating the signaling of photoreceptors. This helps the eyes adapt more effectively to different brightness environments, improving their adaptability to changes in light. Blue light filtering technology reduces the amount of blue light emitted by electronic screens, reducing the need for eye adjustment in different brightness environments. Through double protection, the eyes are more easily adapted to changes in light, reducing the probability of eye discomfort and further improving visual comfort.

4.2 The effect of synergy on improving vision protection

The synergistic effect of lutein with blue light filtering technology can not only improve the effectiveness of vision protection, for example, for a group of people who work in an office, and use computers and other electronic devices for long periods of time is the norm. These people are often exposed to constant eye irritation from the blue light emitted by electronic screens, which can easily lead to eye strain and discomfort. By wearing glasses with lutein filters, the effects of blue light can be mitigated to a certain extent, as lutein is able to absorb and filter out a portion of blue light. Such lenses not only have the blue light filtering function of lutein, but also use blue light filtering technology on the lens to further enhance the blocking effect of blue light. This synergy can effectively reduce eye fatigue and improve productivity and visual comfort. Also, consider a group of students who regularly use tablets or e-book readers for their studies. In this scenario, it is necessary to consider not only the effects of blue light, but also the visual fatigue caused by radiation from electronic devices and prolonged eye use. The use of radiation-blocking glasses that contain both lutein and blue light filtering technology can provide all-round eye protection. Lutein mitigates the effects of radiation on the eyes by absorbing blue light and other harmful spectrum; Blue light filtering technology reduces visual fatigue caused by blue light. Such glasses provide students with better vision protection during the learning process and help maintain concentration and comfort for long periods of study.

4.3 Practical application suggestions and strategies

For those who use electronic devices for long periods of time, wearing a lutein filter or glasses containing lutein is a simple and effective strategy. This helps to alleviate the direct irritation of the eyes caused by the blue light emitted by the electronic screen, relieving eye strain. When shopping for screen protectors, glasses, or other blue light filtering products, choosing a reliable product with visible results is key. Products should cover the entire blue light spectrum and meet the relevant eye protection standards to ensure comprehensive blue light protection. Adjusting the brightness and color temperature of the screen on electronic devices is another effective strategy. Lowering the screen brightness and adjusting to warm tones can reduce the amount of blue light released, which can reduce irritation to the eyes. In the case of prolonged eye use, using the 20-20-20 rule can help reduce eye fatigue. Every 20 minutes, staring at the distance for 20 seconds to

give your eyes a short rest can help prevent eye discomfort from occurring. Good eye habits such as blinking regularly, maintaining proper eye distance, and maintaining a correct sitting posture are equally important for maintaining eye health. These habits, along with the application of lutein and blue light filtering technologies, work together to promote vision preservation^[5].

5. Conclusion

In order to maintain eye health, we recommend that everyone fully understand the benefits of lutein and blue light filtration technology in the use of electronic devices, and take corresponding protective measures in real life. With science-based eye care strategies, we can better enjoy the conveniences of the digital age while reducing the potential impact of electronic device use on our precious vision.

About the authors

Zhang Yongshuai (1980-), Male, Han nationality, Prof. Research Direction: Traditional Chinese Medicine. Email: md99 @ live.com.

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Application Of Perioperative Nutritional Management Plan For Patients Undergoing Pancreaticoduodenectomy

Xuelian He¹, Yan Meng*

Department of Hepatobiliary and Pancreatic Surgery, The First People's Hospital of Jingzhou City, Hubei Province, 434000, China.

Abstract: The aim was to explore a dietary control model suitable for patients undergoing pancreaticoduodenal surgery in order to better improve their nutritional status, minimize complications and improve patient satisfaction. Methods 60 patients who were to undergo pancreaticoduodenectomy were treated according to the usual nutritional management and divided into 30 cases. The observation group adopted the method of whole personalized nutritional management, formulated various nutritional support systems and procedures, organized nutritional knowledge training, and carried out quality control on them. Results The observation group was significantly better than the treatment group in terms of hospitalization days and hospitalization costs ($P < 0.05$); the postoperative complications in the observation group were 10.0%, which was significantly better than the control group of 40.0% ($P < 0.05$). Conclusion Perioperative nutritional management is a new idea more adapted to contemporary medical thought and today's accelerated rehabilitation surgery development for the health of patients.

Keywords: Combined Nutritional Management; Pancreaticoduodenectomy; Perioperative; Nursing Care

Introduction

Pancreaticoduodenectomy is a common surgical major operation, because it requires gastrointestinal anastomosis, therefore, the remodeling of the gastrointestinal tract will have a great impact on the normal physiology of the gastrointestinal tract and intestines of the patient. Aiming at the current nutritional problems in performing pancreaticoduodenectomy, a set of nutritional management methods suitable for patients undergoing pancreaticoduodenectomy is proposed with the goal of reducing the incidence of postoperative complications and improving patient satisfaction.

1. Information and methods

1.1 General information

The 60 patients were divided into 2 groups according to the treatment time. Of the 30 patients in the observation group, age 37-69 years old, mean (55.3 ± 7.8) years old; 30 patients in the control group; a total of 36 patients in both groups were diagnosed with pancreatic tumors by examination, age 41-70 years old, mean (58.4 ± 8.9) years old; 19 cases of intraduodenal tumors; and 5 patients with tumors of the lower part of the bile duct^[1].

Inclusion criteria were: ① CT diagnosis of pancreatic cancer patients; ② age ≥ 18 years old; ③ age ≤ 70 years old; ④ intended to perform pancreatic cancer resection; ⑤ NRS2002 Nutritional Risk Screening Scale ≥ 3 points; ⑥ no gastrointestinal digestive diseases, and able to implement enteral nutrition.

Exclusion criteria: ① Non-pancreatic cancer; ② Combined serious complications; ③ Gastrointestinal dysfunction, unable to perform enteral nutrition.

1.2 Methodology

1.2.1 Models of preoperative nutritional management

Control group: no nasogastric tube was placed before the operation, all the preoperative period was the same as that of the treatment group, and intravenous hypernutrition was used until anal defecation at the end of the operation, which was gradually converted to enteral nutrition.

Observation group: standardized nutritional support program: (1) first, establish a nutritional care team consisting of clinicians, nurse leaders, clinical dietitians and nursing staff; assist in the development of perioperative nutritional programs, systems and procedures; carry out training on relevant knowledge about nutritional support; nursing staff should follow the standards of enteral nutritional care, and at the same time, they should pay close attention to all kinds of nutritional statuses of the patients, and do a good job in the preventive work of various complications that appear during the period of receiving nutritional support, so as to achieve early diagnosis and treatment. (2) Nutritional intervention: For patients with nutritional risk, appropriate nutritional intervention should be carried out to calculate the appropriate nutritional intake ratio for each meal of the day according to their nutritional deficiency status and the nutritional requirements of the human body, so as to make the nutritional status of the patients be effectively improved. However, for obese patients, medical staff should pay more attention to the nutritional ratios of meals to prevent nutritional metabolic disorders. Pre-operative enteral nutrition and nutritional management 4-6 days before surgery: adopt the principle of “step by step” nutritional support, i.e., self-feeding → oral nutritional supplementation → enteral nutrition → parenteral nutrition: ① Requirements for daily energy needs: 25-30 kcal/kg x body weight (kg) x age coefficient x activity factor (AF) x Body Temperature Factor (TF); ② Requirements for protein, fat, and carbohydrates (calculate kcal and then grams according to the ratio of the three to the total calories); ③ Calculate the amount of the three nutrients in three meals; ④ Convert grains and potatoes, fruits and vegetables, meat and eggs, and sugars and fats according to the exchange of portions; ⑤ Set up a set of basic recipes.

1.2.2 Models of postoperative nutritional management

Control group: given routine to carry out parenteral nutrition therapy. On this basis, based on the patient’s nutritional status and various indexes, and in connection with the patient’s physical condition, the daily energy required was determined, and parenteral nutrition therapy was administered using central venous cannulae within 1 d of the operation, and was administered for 12-16 hours per day for 7 days. The dosage of parenteral nutrition was gradually reduced after the patient returned to a transoral diet.

Observation group: (1) Enteral nutrition therapy was started early (24 hours) after surgery, 500 ml of glucose solution was given to nourish the gastrointestinal tract via naso-jejunal nutritional tube on the 1st day of surgery. Enteral nutrition was given from the second day of surgery if there was no significant discomfort. A constant-rate infusion pump and warming were used to gradually increase the rate from 20 ml/hour to 100 ml/hour, with a total flow of 1000-1500 mL/day. Beplex (product name: Beplex), manufactured by Newdia Pharma (Wuxi), was initially infused at a rate of 20 ml/h-1 and then gradually increased as the patient received nutrition. According to the traditional enteral nutrition management method, the patient’s bed is elevated by 30-45 degrees, so that the water temperature of the nutritional solution is maintained at about 37°C, and this is used as a criterion, and the patient is monitored for gastrointestinal tolerance once every 6 hours or so, and its use should be stopped or slowed down^[2] immediately in case of bloating, diarrhea, nausea, vomiting, and so on. (2) Combination of postoperative parenteral nutrition and enteral nutrition: ① Infusion of parenteral nutrition is started according to the energy requirement, and on the first day of postoperative period, 5% GNS 250 mL is fed by tube. the parenteral nutrition solution is a bag of 3L configured with a heat-to-nitrogen ratio of 100-150:1, and the proportions of carbohydrates, fats, and proteins are 50%—60%, 20%—30%, and 15%—20%, respectively. Immunonutrients such as amino acids (glutamine, W-3 unsaturated fatty acids and arginine) were supplemented. ② On the 3rd postoperative day, 500ml—1000ml of whole protein enteral nutrition milk was fed by tube. ③ On the 5th postoperative day, a light liquid diet was injected orally. ④ On the 6th postoperative day, gradually transition from liquid diet to semi-liquid diet. ⑤ Stop parenteral nutrition on the 8th postoperative day. When gastric residue or symptoms of intolerance to enteral nutrition such as abdominal distension, diarrhea, vomiting and so on appear more, prokinetic drugs should be used first to promote gastrointestinal peristalsis instead of blindly stopping enteral nutrition; lastly, the effect and safety of nutritional support should be evaluated dynamically and nutritional support programs should be provided when it is necessary to adjust the rate of nutrition. (3) Nutritional monitoring throughout the whole process: punctual nutritional monitoring should be done for the admitted patients from the beginning to the post-discharge period, closely observe the nutritional status of the patients, and intervene in a timely manner when malnutrition occurs in the patients, so that not only the intraoperative surgical risk of the patients can be reduced, and at the same time the reduction of postoperative complications can be achieved, and it can be possible to make timely prediction of the patient’s condition, and to fully understand the real-time status of the patients.

1.2.3 Nutritional support options

1.2.3.1 Enteral nutrition support

Enteral nutrition is a way of supplying nutrients to patients through the gastrointestinal tract. Compared with parenteral nutrition, enteral nutrition therapy is more effective, which is conducive to maintaining the normal function of the intestinal tract and reducing complications. Tao Dan (2016) showed that early enteral nutrition therapy can improve the body's organic immunity, reduce the pressure on the body, reduce the body's inflammation, reduce the infection rate, maintain the normal physiological function of the patient, and thus reduce the number of days of hospitalization of the patient. At present, there are a variety of different tube feeding nutrition programs at home and abroad, but most of the Li Jinjun (2016) study believes that the safest and most efficient method is not clear, and its biggest reference standard is whether the operator has mastered the relevant technology, and in the process of operation there may be diarrhea, abdominal pain, abdominal distension, reflux and misinsufflation, and other adverse reactions, which can lead to the interruption of enteral nutrition feeding. For patients with poor nasal feeding, it has been shown that rational dietary interventions can significantly improve the dietary tolerance and nutritional completion rate of PD patients. Guidelines for adult perioperative nutritional support also suggest that enteral nutrition should take into account the patient's intestinal tolerance, starting from 20-30 ml/hour, and at the same time, the patient's digestion and feeding tolerance should be closely monitored. Our scholars have proposed the use of EN three-stage nursing decision-making, which improves patients' reliance on EN by providing them with knowledge and guidance on the significance of nutritional support and ways to alleviate uncomfortable symptoms in a hierarchical manner. Studies have found that early bed rest and exercise are associated with enteral nutrition tolerance, and that lack of exercise is an important cause of enteral malnutrition in the early postoperative period. In line with the concept of "Accelerated Recovery", it is recommended that patients should get out of bed and exercise more frequently in the early post-surgical period, which is conducive to the recovery of digestive tract function and enhances the patients' ability to tolerate nutrition.

1.2.3.2 Parenteral nutritional support

PN refers to patients who are unable to ingest or have insufficient intake through the gastrointestinal tract, and are supplied with the nutrients they need through the vein to promote anabolism and inhibit catabolism, thus maintaining the body's normal physiological functions. Parenteral nutrition is a major form of nutritional supplementation for patients who cannot be fed through parenteral nutrition, which allows the body to receive the required nutrient intake as early as possible. It has been shown by Yang Liangliang (2015) that intravenous parenteral nutrition is an effective and efficient treatment for 232 patients with postoperative complications, but its side effects are mostly hyperglycemia, while infections of blood origin are rare. However, the application of PN also has certain dangers, and long-term application of PN can cause changes in the structure and function of intestinal epithelial cells, which can lead to clinical infections and sepsis, which is detrimental to the recovery of patients. In addition, patients treated with parenteral nutrition will also develop various metabolic diseases, such as re-feeding syndrome, hyperglycemia and blood electrolyte disorders, etc.^[3]. Scholars^[2,3] believe that improving the nutritional status and liver function of PD patients by both enteral and parenteral means can not only reduce the occurrence of infections, but also reduce the number of hospitalization days of patients.

Therefore, adequate nutrition at the initial stage of surgery is essential to improve the prognosis and reduce patient mortality. It is recommended that patients who are malnourished before surgery, have high nutritional risk and have serious complications at the early stage of surgery should be given nutritional support immediately. At present, scholars at home and abroad generally attach importance to parenteral nutrition therapy, and break through the inherent understanding of "parenteral nutrition within 24 h". However, the interruption of enteral nutrition occurs from time to time due to the different tolerance level of patients to enteral nutrition.

1.3 Observation indicators

Clinical indicators, nutritional status, immunological indicators (CD4, CD8, TNF α , endotoxin, etc.), hospitalization days, costs, incidence of various postoperative adverse effects, and incidence of postoperative complications such as pancreatic fistulae, bile leaks, abdominal infections, gastrointestinal hemorrhage, and pulmonary infections were observed before and after surgery.

1.4 Statistical methods

The results obtained were processed using SPSS 23.0 statistical package. Count data were expressed as mean \pm standard deviation, and the two methods were analyzed for comparison between groups. Measured data were statistically analyzed by chi-square test or Fisher's precision test and expressed as absolute value or percentage, respectively. $p < 0.05$ indicates significant difference.

2. Results

(1) Comparing the observation group with the control group, the endotoxin level, CD4/CD8 ratio, tumor necrosis factor α , and IL-10 levels of the observation group were significantly better than those of the control group, as shown in Table 1.

(2) Differences in nutritional status between the two groups of patients. There was no statistical significance ($P > 0.05$) in the comparison of total protein and body weight between the two groups of patients in the preoperative and postoperative periods. The serum albumin levels in each group on postoperative days 3, 5, and 7 are shown in Table 2.

Table 1 Changes in immunologic indices in patients one week after surgery

operation	1 days after operation	3 days after operation	6 days after operation
内毒素 (ng/L)			
治疗组	0.51 \pm 0.17	0.35 \pm 0.11	0.25 \pm 0.28
对照组	0.63 \pm 0.30	0.46 \pm 0.14 ^a	0.41 \pm 0.19 ^a
T test	0.9375	15.64 ^a	7.56 ^a
CD cells (CD4+/CD8+)			
治疗组	1.45 \pm 0.09	1.61 \pm 0.05	1.68 \pm 0.07
对照组	1.43 \pm 0.07	1.40 \pm 0.08 ^a	1.64 \pm 0.04 ^a
T test	1.47	10.52 ^a	4.54 ^a
TNF-α (ng/L)			
治疗组	604 \pm 112	413 \pm 89	301 \pm 13.3
对照组	594 \pm 87	553 \pm 49 ^a	452 \pm 25 ^a
T test	0.86	8.62 ^a	39.02 ^a

^a $P < 0.05$ treatment group vs. control group.

Table 2 Comparison of the two groups postoperatively

3 天	27.3 \pm 3.6	22.4 \pm 4.0
5 天	29.7 \pm 3.1	23.5 \pm 3.8
7 天	30.4 \pm 3.6	26.5 \pm 4.4

(3) Observe the surgical results of the two groups of patients. RESULTS: 27.3% and 30.7% (8/26) in the experimental group and control group respectively. The number of postoperative anal tube evacuation, average hospitalization days and treatment cost were observed in the two groups. RESULTS: Compared with the conventional method, there were significant differences between both groups, and the anal tube exhaustion in the observation group was significantly faster and became better in 2~3 days.

(4) The patients in both groups prepared enteral nutrition preoperatively and received enteral enteral nutrition in the early postoperative period were well tolerated, and their most common discomfort symptoms were abdominal distension, nausea, and abdominal pain, which improved rapidly after symptomatic treatment, and the delivery of energy and electrolytes via the nasointestinal tract was also consistent with the physiology of the body, and the patient's subjective discomfort was also significantly relieved.

3. Discussion

Pancreaticoduodenectomy is a classic surgical procedure for the treatment of patients with pancreatic cancer, duodenal jugular cancer, cholangiocarcinoma, and neuroendocrine tumors. Its morbidity and mortality rate is around 3%—4% due to its high level of injury and more complications. It is now widely recognized that there is a strong link between postoperative complications and patient malnutrition, so good nutritional support for patients is of utmost importance. Enteral nutrition and parenteral nutrition are the two most commonly used nutritional support methods at present. Enteral nutrition is a kind of digestive tract-based, through the nasoduodenal tube, nasojejunal tube, intraoperative fistula and other tubes to the gastrointestinal tract to supply the body's required nutrients and a variety of nutrients, generally used for patients with normal operation of the digestive tract^[4]. Parenteral nutrition is a peripheral intravenous or central venous nutrition for postoperative and critically ill patients, all nutrition comes from the venous access, and its role is to maintain the nutritional status of the patient and to help the patient's trauma recovery if he/she is not able to eat. The gastrointestinal tract is not only an organ with good digestive, absorptive and defensive abilities, but also an important immune tissue of the organism, therefore, the role of the gastrointestinal tract is getting more and more attention. At the same time, the influence of enteral nutrition on postoperative nutrition of postoperative patients has also been increasingly emphasized by the majority of patients, and it has been gradually applied to the clinic. At the initial stage, enteral nutrition can be used as a way to supply energy to the tissues, thus accelerating the peristalsis of the intestinal tract, and it can also promote the proliferation of intestinal epithelial cells, as well as the secretion of gastrointestinal hormones, which enables the barrier function of the gastrointestinal tract epithelium to be maintained, and avoids the abnormal delivery of intestinal microecology, thereby reducing the chances of intestinal-borne infections. In addition, enteral nutrition has many advantages, such as: more compatible with human physiology, easy to administer, and lower cost. The results of our previous study showed that the control group treated by enteral nutrition was significantly better than the control group in terms of basic nutritional recovery, gastrointestinal function recovery time, complication rate, average hospitalization days, and total cost ($P < 0.05$).

In conclusion, early enteral nutrition therapy is closer to the physiological needs of human beings, safe and convenient, inexpensive, and short hospitalization time, which can reduce postoperative complications, accelerate the recovery process of patients, and speed up the normal life of patients.

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Correlation Study between Genetic Polymorphisms and Blood Concentrations of Sodium Valproate in Pediatric Epilepsy Patients

Li Li, Yaning Zhu, Tongfei Yang, Zhuo Li^{*corresponding author}, Peng Zhang

Pharmacy Department, Shaanxi Provincial People's Hospital, Xi'an, 710000, China.

Abstract: Objective: To explore the correlation between genetic polymorphisms and blood concentrations of sodium valproate in pediatric epilepsy patients, providing evidence for individualized treatment of epilepsy patients. Methods: Pediatric epilepsy patients diagnosed with epilepsy and treated with sodium valproate monotherapy in the outpatient and inpatient departments of a tertiary hospital from January 2020 to December 2023 were selected. The steady-state blood concentrations of sodium valproate were monitored, and polymerase chain reaction (PCR) was used to genotype ABCB1G2677T/A and UGT1A6T19G genes. Data were analyzed using SPSS 17.0 statistical software. Results: The UGT1A6T19G gene polymorphism significantly affected the blood concentrations of sodium valproate in epilepsy patients. Carriers of the G allele had significantly lower blood concentrations of sodium valproate than wild-type homozygotes (TT) patients, and the decrease in blood concentrations of sodium valproate was particularly significant in homozygous mutant GG genotype patients. The ABCB1G2677T/A gene polymorphism had no statistically significant effect on the blood concentrations of sodium valproate in pediatric epilepsy patients. Conclusion: Through the study of the correlation between genetic polymorphisms and blood concentrations of sodium valproate, factors influencing the steady-state trough concentrations of valproate can be revealed from a genetic perspective, providing theoretical evidence for the precise use of sodium valproate in pediatric epilepsy patients.

Keywords: Genetic Polymorphisms; Pediatric Epilepsy; Sodium Valproate; Blood Concentration

Introduction

Sodium valproate (VPA) is a commonly used first-line broad-spectrum antiepileptic drug in clinical practice. However, VPA has a narrow therapeutic window, and there is considerable inter-individual variation among patients. Deviations of VPA blood concentrations from the normal range may lead to poor clinical efficacy or increased risk of adverse drug reactions. UDP-glucuronosyltransferases (UGT) metabolize approximately 50% of VPA in the human body. The genetic polymorphism site T19G of the major subtype UGT1A6 may alter the structure, expression, and activity of the enzyme protein, thereby playing an important role in increasing inter-individual pharmacokinetic differences of VPA among patients^[1,2]. Additionally, the current conclusions regarding the correlation between the genetic polymorphism ABCB1G2677T/A and VPA blood concentrations are controversial^[3,4], but its impact on VPA metabolism cannot be ignored. This study aims to explore the correlation between genetic polymorphism and VPA blood concentrations, providing reference for rational clinical drug use.

1. Methods

1.1 Study subjects

A total of 108 children with epilepsy who visited our outpatient and inpatient departments from January 2020 to December 2023 were selected as study subjects. Approval from the Ethics Committee of our tertiary hospital was obtained, and all subjects provided informed consent.

1.2 Inclusion criteria^[5]

① Diagnosis of epilepsy conforms to the diagnostic criteria of the 2014 revised edition of the International League Against Epilepsy. ② Han Chinese children with epilepsy (aged <18 years) who have been taking monotherapy with sodium valproate for a long term (>2

weeks). ③ No severe hepatic or renal dysfunction, cardiovascular, gastrointestinal diseases, or severe mental disorders. ④ Good treatment compliance and complete collection of case data.

1.3 Exclusion criteria

① Non-epileptic seizures, such as psychogenic seizures or seizures caused by other reasons. ② Malignant lesions, progressive or degenerative diseases. ③ Poor treatment compliance or missing case data. ④ Long-term concurrent use of other drugs affecting valproic acid metabolism, such as carbapenem antibiotics, phenytoin, or carbamazepine. ⑤ Occurrence of severe adverse reactions.

1.4 Blood sample collection

After reaching steady-state blood drug concentrations of sodium valproate (at least 5 half-lives), 4 ml of venous blood was collected in EDTA anticoagulant tubes from the subjects 30 minutes before the next dose. After blood collection, the samples were stored in a refrigerator at -20°C, and DNA was extracted for genetic sequencing.

1.5 Genetic sequencing and typing

For the genetic sequencing and typing, the PCR amplification reaction system consisted of PCR Mix (22 µL), Primer F (10 pmol/µL, 1 µL), Primer R (10 pmol/µL, 1 µL), and DNA (1 µL). Three microliters of the PCR product were used for 1.0% agarose gel electrophoresis, and the electrophoretic patterns were photographed under UV light at 254 nm. After purification of the PCR products using magnetic beads, genetic sequencing was performed using a genetic sequencer. The Phred/Phrap software was then used for polymorphism analysis, and the analysis results were exported.

1.6 Statistical analysis

Statistical analysis was performed using SPSS 20.0 statistical software. The Hardy-Weinberg genetic equilibrium test was used to analyze the distribution of UGT1A6T19G genotypes. A P-value > 0.05 indicated that the samples included had good representativeness. Continuous data conforming to normal distribution and homogeneity of variance were expressed as mean ± standard deviation ($\bar{x} \pm s$). Independent sample t-test was used for comparison between two groups, and one-way analysis of variance was used for comparison among multiple groups. Count data were expressed as cases (%), and the chi-square test was used for comparison. A P-value < 0.05 indicated a statistically significant difference.

2. Results

2.1 Comparison of standardized blood concentrations of valproic acid among different genotypes of ABCB1G2677T/A

Among the 108 study subjects, the frequencies of GG, GT, GA, TT, TA, and AA genotypes at the ABCB1G2677T/A locus were 20%, 38%, 7%, 16%, 17%, and 3%, respectively. Single-factor analysis of variance was used to compare the standardized blood concentrations of valproic acid among the GG, GT, GA, TT, TA, and AA groups. With $P > 0.05$, there was no statistically significant difference in the standardized blood concentrations of valproic acid among the six genotype groups.

2.2 Comparison of standardized blood concentrations of valproic acid among UGT1A6T19G genotypes

Among the 108 study subjects, the frequencies of TT, TG, and GG genotypes at the UGT1A6T19G locus were 59%, 31%, and 10%, respectively. Single-factor analysis of variance was used to compare the standardized blood concentrations of valproic acid among the TT, TG, and GG genotype groups. With $P < 0.05$, there was a statistically significant difference in the standardized blood concentrations of valproic acid among the three genotype groups. Independent sample t-test was used to compare the standardized blood concentrations of valpro-

ic acid between the wild-type group (TT) and the mutant gene carrier group (TG+GG): the standardized blood concentrations of valproic acid in the (TG+GG) group were significantly lower than those in the TT group ($P < 0.05$).

3. Discussion

The effective blood concentration of valproic acid is crucial for the treatment of epilepsy, and factors influencing valproic acid metabolism in the body are numerous, complex, and exhibit significant individual differences, with genetic factors being particularly important^[6]. The results of this study indicate that the UGT1A6T19G gene polymorphism significantly affects the blood concentration of valproic acid in epileptic patients. Carriers of the G allele exhibit significantly lower blood concentrations of valproic acid compared to individuals with the wild-type homozygous (TT) genotype, and the decrease in blood concentrations of valproic acid is particularly significant in patients with the homozygous mutant GG genotype. This suggests that carriers of the G allele have enhanced metabolic capacity for valproic acid in the body, resulting in lower blood concentrations of valproic acid under conventional dosing regimens. Therefore, consideration should be given to adjusting the dosage or treatment regimen accordingly. Currently, there is limited research on the correlation between ABCB1G2677T/A gene polymorphism and valproic acid blood concentration, and the conclusions are inconclusive. This study also did not find a correlation between ABCB1G2677T/A gene polymorphism and valproic acid sodium blood concentration.

4. Conclusion

Genomic research is of great significance for the individualized use of VPA. The efficacy and adverse reactions of VPA are influenced by polymorphisms in receptors, effector pathways, absorption, metabolism, and transporters. Tailoring individualized treatment plans for patients based on different genotypes, combined with blood concentration monitoring, will greatly improve the effectiveness and safety of clinical epilepsy treatment. Genetic testing may become an important predictive method for the efficacy and adverse reactions of VPA treatment for epilepsy. There is still controversy over some single nucleotide polymorphisms related to VPA, which need to be further confirmed in large samples and different populations. It is hoped that more functional genes and their polymorphic characteristics will be discovered in future research, gradually achieving precision medicine for VPA.

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Influence Of Wang Ji's Theory Of “No Fixed Points For Treatment” On The Clinical Practice Of Acupuncture And Moxibustion

Qixin Lyu, Jing Xu*

Chengdu University of Traditional Chinese Medicine, Chengdu 610072, China.

Abstract: Wang Ji opposed the mechanical use of “a certain point for a certain disease” and proposed the theory of “no fixed point for the treatment of disease” in his “Acupuncture and Moxibustion”, believing that the diagnosis and treatment should be investigated into the cause of the disease, the transmission of the disease and the meridians and channels, and the division of qi and blood, in order to obtain the rationale of random adaptation. Wang Ji advocated that the method of acupuncture should be decided according to the specific situation of the patient, and this academic thought is consistent with the main theme of Chinese medicine’s diagnosis and treatment, and the theoretical ideas corresponding to various fields have been developed around the theory of “no fixed point for treating disease”, which has had a crucial impact on the clinical treatment of acupuncture.

Keywords: Wang Ji; Academic Thought; Cure Disease Without Fixed Points; Acupuncture Treatment; Clinical Thinking

Introduction

Wang Ji, a scholar with the name Shi Shan Jushi, applied for the imperial examination in his early years, and then practiced medicine with his father and Zhu Danxi, who was a private scholar, and eventually became famous for his medical practice. Wang Ji spent his whole life in the study of medical theory, and was bold enough to express his views on academics and argue against the opinions of the public. He emphasized the importance of replenishing qi and blood, and was partial to regulating qi. Wang’s popular acupuncture techniques in the Yuan and Ming Dynasties, “meridian flow injection method” holds a different view, “Acupuncture and Moxibustion”^[1] in the preservation of a number of not seen in the “Acupuncture and Moxibustion Dacheng” of the information, both the “Yellow Emperor’s Classic of Internal Medicine” and other ancient medical writings and medical treatments about acupuncture, but also Wang Ji’s personal profile and comments. Wang Ji traces the origin of acupuncture and moxibustion, explains the essence of acupuncture and moxibustion of “Suwen” and “Nanking”, exposes some defects in acupuncture and moxibustion, and dares to express his own opinion, which occupies a certain position in the history of acupuncture and moxibustion academics.

1. Formation of the theory of “no fixed point for treating disease”

Diseases in the clinical manifestations are often intricate, ever-changing, so acupuncture treatment with needles and acupuncture points, can not be the same, do not know how to change. Therefore, Wang Ji pointed out in “Acupuncture and Moxibustion” that “the law of rules is in the teacher, the law of square and round is in the disciple.” Doctors “should know the living method of the round machine, can not keep the power”. Therefore, in the identification of acupuncture points, Wang Ji proposed “no fixed points for treatment”, that the clinic can not be confined to a certain point for a certain disease, denying the clinical many doctors only recognize the dogma, blindly needling the vice. People have suffering called disease, the main cure lies in the elimination of the cause of disease, the ancients divided the cause of disease into three categories: ① external causes: external six; ② internal causes: internal injuries to the seven emotions; ③ not internal and external causes. Thus, “the disease is infinite, moxibustion method is also infinite”, the doctor should know how to adapt, according to the disease etiology and pathogenesis, the law of transmission, the flexibility of the choice of acupuncture points^[2].

2. Theories formed around the “treatment of disease without fixed points” and its influence

2.1 “But depending on the float of the disease, and for the shallow stabbing ... Ya to qi to the period, not to call the number of wait.”

On the depth of acupuncture, Wang Ji pointed out: “but depending on the float and sink of the disease, and for the shallow depth of the prick But the gas to the period, not to call the number of waiting.” That is, the clinical treatment need not be bound by the books on the prescribed inches, should be the patient’s specific circumstances to determine the depth of acupuncture. Needle time should not be determined by the number of exhalations, but should be determined according to the situation of gas to.

2.2 “Depending on the thickness of the flesh of the acupuncture point, the severity of the disease, and for the moxibustion.”

On the appropriate number of acupuncture points of moxibustion, Wang Ji believes that: “depending on the thickness of their acupuncture points and flesh, the severity of the disease, and for the moxibustion of how much, the size of the ear, do not have to abide by its rules.” Moxibustion size, the number of times should be judged according to the condition, flexible, do not have to abide by the rules.

2.3 “Evil guest meridians, for its suffering, moxibustion of necessity, no disease and moxibustion, what is the intention of the matter?”

According to “Huangdi Neijing”, “Difficult Classic”, and Zhu Danxi, Luo Tianyi and other people’s views that moxibustion is suitable for wind-cold-damp paralysis, vegetative yang deficiency, yang qi sinking or yang qi wanting to extinguish and other symptoms, moxibustion treatment of cough disease, head and eye disease, carbuncle and gangrene began to develop and other diseases to put forward their own insights. Wang cited the “Spiritual Pivot” cloud: “trapped under the moxibustion,” the “Medical Compendium” said: “most can not be stabbed, it is appropriate to moxibustion. A sinking cold chronic cold; two is no pulse, know Yang extinct; three is the abdominal skin anxious and sun sinking. Shed these three, the rest are not moxibustion, cover the fear of causing the reverse also.” Wang thus proved that the main function of moxibustion is to warm the cold, support Yang fixed off. Wang Ji also believes that the number of pulse Shen can not moxibustion, summer and floating pulse can not be moxibustion, are because the main moxibustion warm yang, easy to burn the bones and injure the tendons, to the body of the fire, resulting in the surface of the evil can not penetrate out into the body, so do not use moxibustion.

Wang Ji that: “evil guest meridians, for its suffering, moxibustion of necessity, no disease and moxibustion, what do you want to do?” Against the “no disease and moxibustion, to prevent disease” point of view, “if you want the body to be safe, anointing the vital area, the three miles often do not dry” skeptical attitude, that people have a disease such as the country’s theft, not until the last resort, not to soldiers to cut down the. That a point by moxibustion, stabbing a muscle for hard, blood stagnation can not walk. And give an example to illustrate, said a doctor to cure a cripple, take its foot Lin sob, because the patient in the past often moxibustion of various acupuncture points, and doctors want to pass through its meridians to receive gas over the disease, the meridian gas to the moxibustion scar at the end of the not work, only to know that moxibustion fire into the meridian bad. This point of view of no disease avoid moxibustion in later generations of verification, although biased, but Wang’s evidence-based treatment, moxibustion in the study of the contribution made is still indelible ^[3-5].

2.4 Examining the disease in the meridians and channels

Meridian disease is disease, the position of deep in the inside; Luo disease is disease, the position of shallow in the surface. Wang Ji pointed out that: “all diagnostic veins, color green is cold and pain; red is hot. Interfluvial complex green, cold stomach; Interfluvial complex red, hot stomach. The violent black, stay for a long time paralysis. The red, black and green, cold and hot gas. Green short, less gas.” “The disease of the complex, its disease and the meridian muse is also, it is also appropriate to stab the right on the left and the right on the left.” That is, the disease of the collateral veins is manifested as cold, pain, and there are different manifestations of cold and heat ^[6,7]. Also quoted

from the “Nei Jing” cloud “this evil from the skin and hair and enter, extreme in the five Tibet of the second also^[8]. In this way, the treatment of its meridians.” Pointed out that the meridian disease hidden in the five viscera “Acupuncture and Moxibustion” also quoted the scriptures, explaining the liver, heart, spleen, lungs, kidney five viscera have disease clinical manifestations, should be taken to the treatment of meridian disease.

3. Influence on the clinical practice of acupuncture and moxibustion

Wang Ji’s academic view of acupuncture and moxibustion, which is based on the evidence and flexible treatment, has a certain guiding significance to the later generations of acupuncture and moxibustion clinics. The concept of identification and treatment of acupuncture and moxibustion clinics is indisputable, and the two main basic concepts of traditional Chinese medicine should be carried through acupuncture and moxibustion clinics, so that the identification of evidence and treatment can be accomplished under the guidance of the concept of the whole^[9-11]. In the process of identification, the self-characterization of acupuncture treatment is emphasized, and under the guidance of meridian theory, emphasis is placed on the selection of meridians, acupuncture points, and acupuncture treatment methods^[12,13].

4. Summary

In conclusion, Wang Ji’s “treatment of disease without fixed points” brings us not only the summary of his acupuncture theory and its guidance on clinical diagnosis, stabbing method, moxibustion method, and not only the author’s summary and analysis of a few articles, the author believes that it is more of a spiritual connotation of “the rule of law lies in the teacher, and the method of square and round lies in the children! “The spirit of the connotation of the revelation of our acupuncture when the master needle source, to Ling Su, A Yi, Dacheng rules; when the flexible use of clinical variation, randomization to get square and round. In addition still can glimpse its study of Chinese medicine to take the image of the subtlety of the analogies, to stimulate the infinite imagination and creativity of future generations.

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