Proceedings of the 5th International Conference on Modern Medicine and Global Health
DOI: 10.54254/2753-8818/2027.39354

Research Progress on Banxia Xiexin Decoction in the Treatment of Gastric Cancer Based on the Theory of Acrid Opening and Bitter Descending

Yifan Mao

School of Traditional Chinese Medicine, Changchun University of Chinese Medicine, Changchun, China
15304750963@163.com

Abstract. Gastric cancer ranks as the fifth most prevalent malignancy worldwide, with an estimated 968,000 new cases reported in 2022, and remains a leading cause of cancer-related morbidity and mortality. China bears a substantial disease burden, accounting for approximately 37% of global cases. Standard treatments including surgical resection, chemotherapy, targeted therapy, and immunotherapy face prominent clinical challenges such as treatment-related toxicity and drug resistance, highlighting an urgent need for more effective and tolerable adjuvant interventions. Traditional Chinese medicine (TCM) has garnered growing academic and clinical interest as a complementary therapeutic approach, with unique strengths in multi-target modulation, synergistic action, and toxicity attenuation with efficacy enhancement. Accumulating evidence demonstrates that Banxia Xiexin Decoction (BXD) exerts anti-gastric cancer effects via multiple pathways: modulating the inflammatory microenvironment to interrupt the inflammation-to-cancer transition, restoring CD8+ T cell function through the IL-8/STAT3/PD-1 axis, modulating the PI3K/AKT/mTOR signaling pathway, and triggering Nrf2/GPX4-driven ferroptosis. In clinical practice, the combination of BXD with chemotherapy markedly reduces toxic side effects, strengthens therapeutic effectiveness, and improves patients' quality of life and immune function. Rooted in the acrid opening and bitter descending theory from Huangdi Neijing and further systematized in Zhang Zhongjing's Shanghan Zabing Lun, BXD serves as the classic representative formula of this theoretical framework. This paper systematically reviews the research progress of BXD in gastric cancer treatment from the perspectives of theoretical basis, molecular mechanisms, and clinical application, to provide a reference for the integrated Chinese-Western management of gastric cancer.

Keywords: Acrid opening and bitter descending, Banxia Xiexin Decoction, Gastric cancer, Integrated traditional Chinese and Western medicine, Syndrome differentiation and treatment

© 2026 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2753-8818/2027.39354

1. Introduction

Gastric cancer represents a predominant form of malignancy that poses a critical challenge to public health on a global scale. Statistical data from 2022 indicate that this disease accounted for roughly 968,000 newly diagnosed instances and 660,000 fatalities worldwide, thereby securing the fifth position in terms of incidence and the fourth regarding mortality rates among all neoplastic conditions [1, 2]. China is identified as a region with particularly high prevalence, responsible for approximately 37% of the total new cases globally. A significant proportion of patients receive their diagnosis only after the disease has progressed to advanced stages, resulting in a five-year survival rate that remains under 35%. Furthermore, the recurrence of the tumor and its metastasis following surgical intervention continue to constitute primary barriers to achieving positive clinical outcomes. At present, the standard therapeutic approaches encompass surgical resection, chemotherapy, targeted molecular therapy, and immunotherapy. However, the practical utility of these methods is often constrained by substantial toxic side effects, the development of significant drug resistance, and considerable variability in responses among different individuals. Consequently, there is a pressing necessity to investigate adjunctive treatment strategies that are both safe and efficacious.

Within the integrated therapeutic framework for gastric malignancies, Traditional Chinese Medicine (TCM) has garnered growing recognition due to its distinctive benefits, which include systemic regulation, synergistic multi-target actions, and the dual capacity to mitigate toxicity while boosting therapeutic efficacy. Banxia Xiexin Decoction (BXD), a quintessential prescription embodying the strategy of acrid opening combined with bitter descending, was initially recorded in the Shanghan Lun (Treatise on Cold Damage). Contemporary investigations have supplied fresh scientific validation for the anti-gastric cancer properties of this formula. The theoretical foundation of the acrid opening and bitter descending approach is rooted in the pharmacological tenet from the Huangdi Neijing (Yellow Emperor's Inner Canon), which states that "acrid flavors disperse while bitter flavors drain." The central mechanism involves employing acrid medicinal agents to unblock stagnation, facilitate dispersion, and promote the flow of qi, while utilizing bitter herbs to direct qi downward, eliminate turbid pathogens, and clear heat and toxins. This coordinated action serves to re-establish the normal physiological dynamics of ascending and descending functions within the spleen and stomach systems. The aforementioned theoretical framework, along with its corresponding formulaic structure, provides unique insights and methodologies for the prevention and therapeutic management of gastric cancer within the context of Traditional Chinese Medicine (TCM). This paper systematically examines the advancements in research concerning Banxia Xiexin Decoction (BXD) for treating gastric cancer, focusing on three key aspects: its theoretical foundations, underlying mechanisms of action, and practical clinical applications.

2. Theoretical connotation of the method of acrid opening and bitter descending and the composition of Banxia Xiexin Decoction

2.1. Classical origin and theoretical basis of the method of acrid opening and bitter descending

The therapeutic strategy known as acrid opening and bitter descending traces its theoretical roots to the Neijing (The Yellow Emperor's Inner Canon) and was formally systematized within the Shanghan Lun (Treatise on Cold Damage). Its primary objective is to restore the normal ascending and descending dynamics of the middle burner through the synergistic pairing of acrid and bitter herbs. The Suwen (Plain Questions), specifically in the "Zhi Zhen Yao Da Lun" chapter, elucidates that acrid and sweet flavors are associated with dispersion and yang, whereas sour and bitter flavors

DOI: 10.54254/2753-8818/2027.39354

facilitate purging and align with yin. The text further advises that for recurring yangming conditions, treatment should involve acrid-warm agents supported by bitter-sweet ones, utilizing bitter substances to drain and direct qi downward. This guidance laid the groundwork for employing acrid-bitter combinations to harmonize the middle burner. Adhering to this framework, Zhang Zhongjing formulated Banxia Xiexin Decoction by integrating acrid-warm ingredients, such as Pinellia ternata and dried ginger, with bitter-cold components like Scutellaria baicalensis and Coptis chinensis, thereby effectively combining acrid and bitter properties.

This approach is exemplified by a representative formula that simultaneously addresses cold and warm conditions while regulating ascending and descending qi movement. From this foundation, related prescriptions such as Shengjiang Xiexin Decoction and Gancao Xiexin Decoction were also derived. Later medical scholars, including Zhang Bingcheng, Ye Tianshi, and Wu Jutong, further expanded upon this theoretical framework. The central principle posits that acrid flavors function to open, disperse, and eliminate turbidity, whereas bitter flavors serve to clear heat, direct qi downward, dry dampness, and drain fire. By combining these properties, the normal flow of ascending and descending qi is restored, and an equilibrium between cold and heat is achieved. Consequently, the theoretical system governing the method of acrid opening and bitter descending has undergone continuous refinement and development. Regarding its therapeutic mechanism, the strategy of employing acrid substances to promote dispersion and bitter agents to facilitate downward movement addresses the fundamental pathological dynamics characterized by a complex mixture of cold and heat, disrupted directional flow of qi, and blockage within the middle burner. Since gastric malignancy originates in the stomach and maintains intimate physiological connections with both the spleen and liver, its development is primarily driven by an underlying deficiency of the spleen and stomach systems. This chronic weakness gradually evolves into a confluence of cold and heat, accompanied by the buildup of phlegm, blood stasis, and toxic elements, ultimately resulting in the impediment of qi circulation in the central burner. By utilizing pungent herbs to invigorate qi flow and resolve stagnation, alongside bitter ingredients that guide turbid pathogens downward while eliminating heat and toxins, this approach aligns accurately with the essential pathology of gastric cancer. Consequently, it establishes a solid theoretical foundation for the application of Banxia Xiexin Decoction in clinical treatment.

2.2. Composition and compatibility of Banxia Xiexin Decoction

The formulation of Banxia Xiexin Decoction is grounded in the therapeutic strategy of combining acrid dispersion with bitter downward drainage, while simultaneously balancing cold and hot properties alongside tonification and purgation to create a synergistic effect. This prescription is documented in Clause 149 of the Shanghan Lun (Treatise on Cold Damage) as well as in the Jingui Yaolue (Essentials from the Golden Cabinet), specifically within the section dedicated to vomiting, hiccups, and diarrhea. The composition includes half a liter of washed Pinellia ternata, three liang each of Scutellaria baicalensis, dried ginger, ginseng, and honey-fried licorice, one liang of Coptis chinensis, and twelve jujubes. Within this mixture, Pinellia ternata acts as the principal ingredient; its acrid and warm nature helps to alleviate stagnation, reduce abdominal fullness, direct rebellious qi downward, and stop vomiting. Meanwhile, dried ginger, characterized by its acrid and hot qualities, serves to warm the middle burner and dispel cold pathogens. Pinellia is employed in conjunction with other ingredients to pungently resolve stagnation and facilitate the upward movement of spleen qi. Meanwhile, Scutellaria baicalensis and Coptis chinensis, characterized by their bitter and cold properties, serve to eliminate heat, resolve dampness, and guide turbid heat downward, thereby supporting the downward flow of stomach qi. The integration of these four

DOI: 10.54254/2753-8818/2027.39354

medicinal herbs exemplifies a therapeutic strategy that combines pungent dispersion with bitter drainage, balances cold and warm natures, and harmonizes ascending and descending actions, forming the fundamental structural basis of this prescription.

Characterized by their sweet and warm properties, ginseng, jujube, and honey-fried licorice serve to strengthen the middle burner and enhance qi, while simultaneously safeguarding the functions of the spleen and stomach. This formulation serves a dual purpose: it restores the depleted qi within the middle burner while simultaneously mitigating the intense properties of herbs that are both acrid-dispersing and bitter-cold. This approach embodies the therapeutic strategy of integrating tonification with purgation, ensuring that pathogenic factors are eliminated without damaging vital energy, and that reinforcement is achieved without inducing stagnation. By synthesizing elements of acrid opening, bitter descending, as well as contrasting thermal natures (cold and heat) and functional actions (tonifying and purging), the prescription facilitates the upward movement of clear qi and the downward flow of turbid substances. Consequently, it reinstates the transportive functions of the middle earth, balances yin and yang, and alleviates sensations of fullness, establishing it as a quintessential remedy for regulating qi movement in the middle burner. Contemporary research has identified that key bioactive constituents, including berberine, baicalin, 6-gingerol, ginsenoside, and glycyrrhizic acid, exhibit diverse pharmacological properties such as anti-inflammatory, anti-tumor, and immunomodulatory effects. These findings offer a substantive material foundation for the modern scientific elucidation of The therapeutic strategy characterized by the synergistic use of acrid-opening and bitter-descending agents is supported by reference [3].

2.3. Understanding of TCM etiology and pathogenesis of gastric cancer

Within the framework of Traditional Chinese Medicine (TCM), the development of gastric cancer is fundamentally attributed to a complex interplay of factors: a underlying deficiency of vital energy coupled with superficial excess, a mixture of cold and heat pathogens, disrupted flow of qi, and the concurrent presence of phlegm, blood stasis, and toxic elements. This specific pathological constellation provides the theoretical foundation for employing the acrid-opening and bitter-descending treatment approach. While the primary lesion is situated in the stomach, the disease frequently impacts the functional integrity of the spleen, liver, and kidneys. The etiology is largely driven by dietary irregularities, emotional disturbances, inherent constitutional frailty, and the intrusion of external pathogenic factors. As the condition progresses, it leads to visceral disharmony and the stagnation of qi circulation. Historical medical literature categorizes this clinical presentation under terms such as "epigastric pain," "abdominal masses," "accumulations," "dysphagia," and "regurgitation."

Within the etiological framework of gastric malignancy, significant roles are played by emotional disturbances, the stagnation of liver qi, and the pathological pattern wherein wood overacts upon earth. Consequently, therapeutic strategies frequently prioritize calming the liver while harmonizing stomach functions. Located together in the middle burner, the spleen and stomach serve as the central axis for the ascending and descending movements of qi; specifically, the spleen is responsible for raising the clear essence, whereas the stomach directs the downward flow of turbid substances. When these organs suffer from deficiency and their transportive and transformative capabilities are compromised, fluids and dampness accumulate, eventually congealing into phlegm. Furthermore, if the circulation of qi becomes obstructed, blood flow is hindered, leading to the formation of internal blood stasis. Over time, the confluence of phlegm and blood stasis generates heat and toxic substances, which accumulate in the stomach and ultimately lead to malignancy. Consequently, the fundamental pathogenesis of gastric cancer is characterized by a deficiency of the

DOI: 10.54254/2753-8818/2027.39354

spleen and stomach, a complex intermingled cold and heat, disrupted qi movement, and the entanglement of phlegm, blood stasis, and toxins. This condition is generally classified as a syndrome featuring root deficiency accompanied by branch excess. As noted by Xu Jingfan, a renowned national master of Traditional Chinese Medicine, gastric cancer invariably presents with root deficiency and branch excess, involving factors such as dampness, phlegm, turbidity, blood stasis, and qi stagnation. He emphasized that therapeutic strategies should "prioritize the spleen and stomach while establishing stomach qi as the basis" [4].

2.4. The correspondence between the method of acrid opening and bitter descending and the pathogenesis of gastric cancer

The fundamental pathological mechanism underlying gastric cancer is characterized by a complex intermingled cold and heat patterns alongside disrupted qi movement. In clinical practice, sufferers frequently exhibit symptoms such as epigastric distension, emesis, nausea, abdominal rumbling accompanied by diarrhea, as well as oral dryness or a bitter taste. These manifestations underscore the simultaneous presence of cold and heat elements, reflecting a state where deficiency and excess are intertwined. Given this specific etiology, therapeutic strategies must concurrently manage the dichotomies of cold versus heat, ascending versus descending functions, and deficiency versus excess conditions. The therapeutic approach known as acrid opening and bitter descending employs pungent herbs to alleviate depression, disperse stagnation, and facilitate qi circulation, while utilizing bitter-tasting herbs to direct turbid heat downward and eliminate toxic heat. This synergistic combination of acrid and bitter agents helps restore the normal ascending and descending operations of the middle burner and harmonizes conflicting cold and heat states. Furthermore, the inclusion of sweet and warm herbs can bolster vital qi, thereby establishing a treatment framework that directly addresses the core pathogenesis of gastric cancer.

Banxia Xiexin Decoction serves as the quintessential representation of the therapeutic strategy known as acrid-opening and bitter-descending. Within this prescription, Pinellia ternata and dried ginger are utilized for their acrid and warm properties to facilitate opening, while Scutellaria baicalensis and Coptis chinensis employ their bitter and cold nature to promote descending. Additionally, ginseng, licorice, and jujube contribute sweet and warm characteristics to tonify the middle burner. The entire formulation is structured around the principles of acrid opening and bitter descending, effectively harmonizing cold and hot elements while simultaneously integrating reinforcing and purgative actions. This therapeutic approach does more than just alleviate the superficial symptoms associated with the intertwining of cold and heat patterns alongside impaired qi circulation in gastric malignancies; it also tackles the fundamental issue of spleen and stomach insufficiency. Consequently, this strategy aligns well with the intricate pathological framework of gastric cancer, which is characterized by a combination of deficiency, phlegm accumulation, blood stasis, and toxic factors. As a result, Banxia Xiexin Decoction has emerged as a quintessential prescription for the prevention and management of gastric cancer, utilizing the principle of employing acrid herbs to open and bitter herbs to descend. Both contemporary investigations into its mechanisms and its practical clinical usage are centered on this alignment between syndrome identification and treatment methodology.

DOI: 10.54254/2753-8818/2027.39354

3. Study on the mechanism of Banxia Xiexin Decoction in the treatment of gastric cancer

3.1. Regulating the inflammatory microenvironment and blocking the inflammation-to-cancer transformation

The inflammatory milieu serves as the foundational substrate for both the initiation and advancement of gastric malignancy. Consequently, disrupting the transition from chronic inflammation to neoplastic development represents the primary mechanism through which Banxia Xiexin Decoction (BXD) exerts its prophylactic and therapeutic effects. Chronic atrophic gastritis (CAG), widely acknowledged as a precancerous condition, occupies a pivotal position within this inflammatory-to-carcinogenic sequence. In terms of pathological progression, Helicobacter pylori infection drives a sequential evolution known as the Correa cascade, moving from chronic superficial gastritis to atrophic gastritis, then to intestinal metaplasia, followed by dysplasia, and ultimately resulting in gastric cancer. Within this continuum, the inflammatory microenvironment acts as a critical catalyst. Therefore, early identification coupled with timely intervention constitutes an essential strategy for halting disease progression, reversing mucosal atrophy, and preventing malignant transformation [5].

BXD demonstrates the capacity to halt or potentially reverse the process of carcinogenesis through multiple mechanisms, including the suppression of inflammatory mediators within the gastric mucosa, the exhibition of anti-Helicobacter pylori effects, the provision of protection to the gastric lining, and the modulation of the gastric microenvironment. Specifically, this formulation downregulates key pro-inflammatory cytokines, such as tumor necrosis factor-α, interleukin-6 (IL-6), and interleukin-1β, while simultaneously inhibiting inflammation-associated signaling cascades, notably the nuclear factor-κB pathway [6]. Furthermore, BXD holds significant potential for the combined prevention and therapeutic management of gastric cardia cancer alongside precancerous conditions [7]. Additionally, it contributes to the regulation of intestinal flora and the restructuring of the tumor microenvironment. These actions align with the Traditional Chinese Medicine principle of "treating disease before it arises," suggesting that early intervention using the strategy of acrid opening and bitter descending during the precancerous phase of gastric cancer may effectively interrupt or even reverse the progression from inflammation to malignancy.

3.2. Immunoregulatory mechanisms of the IL-8/STAT3/PD-1 signaling axis

From an immunological perspective, Banxia Xiexin Decoction (BXD) has the capacity to rejuvenate anti-tumor immune responses and alleviate the exhaustion of CD8+ T cells by modulating the IL-8/STAT3/PD-1 signaling cascade. In gastric cancer, the exhaustion of CD8+ T cells within the tumor microenvironment serves as a critical mechanism for immune evasion, with the underlying molecular pathways being well-documented [8]. First, tumor-associated macrophages (TAMs) release IL-8, which interacts with CXCR1 and CXCR2 receptors on CD8+ T cells, thereby triggering the JAK2/STAT3 pathway and resulting in the phosphorylation of STAT3 at the Y705 site. Second, this phosphorylated STAT3 (p-STAT3) moves into the nucleus, where it attaches to the promoter region of the PD-1 gene, leading to increased PD-1 expression. This upregulation induces exhaustion in CD8+ T cells, characterized by a diminished release of effector molecules such as perforin, granzyme B, and interferon-γ (IFN-γ). Third, treatment with serum containing Banxia Xiexin Decoction suppresses IL-8 levels and inhibits STAT3 phosphorylation, which subsequently lowers PD-1 expression and reinstates the cytotoxic capabilities of CD8+ T cells. Fourth, studies utilizing nude mice bearing tumors have validated that BXD treatment enhances the infiltration of

DOI: 10.54254/2753-8818/2027.39354

CD8+ T cells into the tumor microenvironment, diminishes the population of regulatory T cells (Tregs), and consequently raises the ratio of CD8+ T cells to Tregs.

The immunomodulatory properties of Banxia Xiexin Decoction (BXD) are further substantiated by evidence demonstrating its capacity to suppress PD-L1 expression and hinder immune evasion via a multitude of targets and signaling routes [9]. Additionally, BXD modulates MGMT levels and influences chemotherapeutic responsiveness by affecting PD-L1 activity through the IL-6/JAK/STAT3 axis [10]. This mechanism aligns with the Traditional Chinese Medicine (TCM) therapeutic strategy of "reinforcing healthy qi while dispelling pathogenic factors," which is achieved by balancing qi movement through the synergistic use of acrid opening and bitter descending herbs, as well as integrating tonification with purgation. Such insights bridge the gap between the traditional macroscopic notion of "reinforcing healthy qi" and concrete molecular processes, thereby establishing a theoretical basis for combining BXD with immune checkpoint inhibitors.

3.3. Regulation of the PI3K/AKT/mTOR core signaling pathway

Gastric cancer cell behaviors, including proliferation, apoptosis, and autophagy, are primarily governed by the PI3K/AKT/mTOR signaling cascade. Furthermore, this pathway serves as a critical therapeutic target for Banxia Xiexin Decoction (BXD) in its anti-gastric cancer actions. A high degree of concordance is observed across the findings of numerous investigations. Data derived from transcriptomics and network pharmacology reveal that BXD and gastric cancer possess 174 shared therapeutic targets, with pathway enrichment primarily centering on PI3K-Akt, HIF-1, and other cancer-associated signaling routes [11]. Further whole-transcriptome screening pinpointed five critical nodes—namely PIK3CA, PIK3R1, AKT1, HSP90AA1, and TP53 [12]—which have been subsequently corroborated through experimental validation [13]. By integrating UPLC-Q-Orbitrap MS/MS with RNA-seq technology, researchers identified 29 chemical constituents and 569 potential anti-gastric cancer targets; KEGG analysis indicated that these compounds exert their effects by modulating the PI3K-Akt pathway, thereby attenuating inflammatory responses and inhibiting cellular proliferation [14]. In terms of mechanism, both BXD-containing serum and the PI3K-specific inhibitor LY294002 were found to impede the proliferation of gastric cancer cells, promote apoptotic processes, and hinder migratory capacity, actions that are associated with the downregulation of pivotal targets including EGFR, PIK3CA, and AKT1 [11].

3.4. Nrf2/GPX4 pathway and ferroptosis induction

The induction of ferroptosis represents another critical mechanism through which Banxia Xiexin Decoction (BXD) combats gastric cancer, functioning synergistically with the previously mentioned signaling cascades. Characterized as a unique mode of cellular demise driven by iron-dependent lipid peroxidation, ferroptosis is primarily governed by the Nrf2/GPX4 axis, which serves as its main negative regulator. Initial studies demonstrated that serum enriched with BXD, particularly at an optimal concentration of 20%, suppresses the proliferation of gastric cancer cell lines such as HGC-27, MKN-45, and AGS in a dose-dependent manner. This treatment also leads to a reduction in mitochondrial membrane potential and superoxide dismutase (SOD) activity, while concurrently elevating levels of lipid peroxide (LPO) and Fe2+. At the molecular level, BXD triggers ferroptosis in gastric cancer cells by downregulating the protein expression of p-GSK3β, Nrf2, and GPX4, upregulating GSK3β, and thereby inhibiting the Nrf2/GPX4 signaling pathway [15]. Furthermore, relevant animal studies have corroborated that BXD modulates the expression of Nrf2, SLC7A11,

DOI: 10.54254/2753-8818/2027.39354

GPX4, and FTH1 expression is modulated, thereby triggering ferroptotic cell death in rat models exhibiting gastric precancerous lesions. It is worth highlighting that the PI3K/AKT signaling cascade plays a pivotal role in governing ferroptosis [16]; consequently, the induction of ferroptosis by BXD, coupled with the suppression of the PI3K/AKT/mTOR axis, may produce synergistic therapeutic effects. Furthermore, when contrasted with the chemotherapeutic agent capecitabine, BXD demonstrates a less severe inhibitory impact on healthy gastric mucosal cells, indicating a degree of selectivity that offers initial support for its clinical safety profile.

4. Clinical application of Banxia Xiexin Decoction in the treatment of gastric cancer

4.1. Clinical study of Banxia Xiexin Decoction combined with chemotherapy

Multiple clinical investigations have substantiated the therapeutic benefits of integrating Banxia Xiexin Decoction (BXD) with chemotherapy regimens. Data from randomized controlled trials indicate that when BXD is administered alongside a combination of cisplatin and 5-fluorouracil, there is a marked enhancement in the overall response rate. Furthermore, this combined approach leads to a significant decline in serum concentrations of hypoxia-inducible factor-1α (HIF-1α), monocyte chemoattractant protein-1 (MCP-1), and endothelin-1 (ET-1). It also positively modulates immune parameters, specifically elevating CD3+ and CD4+ levels as well as the CD4+/CD8+ ratio, while concurrently lowering the frequency of adverse events [17]. In the context of post-surgical gastric cancer care, BXD has been shown to substantially alleviate physical discomfort and enhance quality of life across various domains, including cognitive, emotional, physical, and social functioning, as well as addressing issues like insomnia, appetite loss, and constipation. Additionally, it mitigates the occurrence of toxic side effects such as leukopenia, anemia, thrombocytopenia, and gastrointestinal disturbances, while helping to restore balance to the intestinal microbiota [18]. Collectively, these findings provide consistent evidence that BXD possesses It holds clear significance in bolstering patients' ability to withstand chemotherapy, mitigating adverse toxic reactions, and improving both their overall quality of life and immune system performance.

4.2. Clinical strategies of integrated Traditional Chinese and Western medicine in the treatment of gastric cancer

A holistic, evidence-based paradigm for the standardized clinical deployment of Banxia Xiexin Decoction (BXD) emerges from the convergence of Traditional Chinese Medicine (TCM) and Western medical practices. When utilized as an adjunctive intervention or during the perioperative phase, BXD exhibits multifaceted regulatory capabilities. These include the mitigation of inflammatory stress, the re-establishment of immune equilibrium, and the enhancement of both gastrointestinal motility and barrier integrity. Consequently, this formulation bolsters patient tolerance to treatment, thereby ensuring the secure and efficacious administration of surgical procedures, radiotherapy, and chemotherapy. For example, in the context of laparoscopic distal gastrectomy for gastric malignancies, BXD has been observed to reduce perioperative inflammatory responses and maintain immune stability. In cases involving advanced stages or chemoresistance, the bioactive components of BXD—such as berberine, baicalin, wogonoside, and glycyrrhizic acid—produce synergistic anticancer effects by suppressing ATP-binding cassette (ABC) drug efflux transporters and Key survival signaling cascades, such as PI3K/Akt and NF-κB, are inhibited, which serves to overturn multidrug resistance and heighten the susceptibility of gastric cancer cells to therapeutic agents including cisplatin, 5-fluorouracil, oxaliplatin, and paclitaxel [6]. Additionally,

DOI: 10.54254/2753-8818/2027.39354

BXD influences PD-L1 levels through the IL-6/JAK/STAT3 pathway's regulation of MGMT, a mechanism that further bolsters chemosensitivity [10]. These characteristics—namely, holistic regulation, engagement with multiple targets, and the dual benefit of reducing toxicity while amplifying efficacy—are highly consistent with modern oncological frameworks that prioritize "coexistence with cancer" and "patient-centered care." Within the entire spectrum of gastric cancer treatment, the application of BXD ought to be tailored dynamically, taking into account both the stage of the disease and TCM syndrome differentiation, thus facilitating precise, phase-specific interventions.

4.3. Medical expertise and clinical application

In clinical practice, renowned experts in Traditional Chinese Medicine (TCM) have effectively utilized the therapeutic strategy of acrid-opening and bitter-descending for the management of gastric cancer. Despite variations in approach, there is a consensus among different academic schools on several key principles: harmonizing the spleen and stomach through acrid-opening and bitter-descending techniques, strengthening vital qi while dispelling pathogenic factors, and regulating the flow of qi. These principles align closely with the formula-syndrome correspondence characteristics of Banxia Xiexin Decoction [19]. Nevertheless, specific applications differ across schools. Professor Xu Jingfan highlights that gastric cancer is marked by "root deficiency with branch excess," emphasizing the importance of "safeguarding the spleen and stomach and managing emotional well-being." He frequently employs a modified version of Banxia Xiexin Decoction to regulate the middle burner and achieve a balance between cold and heat [4]. Meanwhile, Professor Wang Xixing promotes the use of acrid-opening and bitter-descending methods to harmonize cold and heat, aiming to alleviate gastrointestinal symptoms and mitigate adverse reactions associated with chemotherapy. Professor Zhou Zhongying It is posited that hidden pathogens are inevitably accompanied by toxins, leading to the consistent application of strategies focused on combating malignancy and eliminating toxins. This approach utilizes a customized version of Banxia Xiexin Decoction, integrated with herbal agents known for their detoxifying and mass-dissolving properties. While the specific methodologies employed by these esteemed practitioners may vary in their execution, they all align with the fundamental therapeutic principle of employing acrid substances to open and bitter substances to descend. This convergence further highlights the significant practical utility of this treatment modality in both the prevention and management of gastric cancer, as well as its extensive applicability in clinical settings.

5. Conclusion and outlook

To conclude, current scholarly investigations have established a unified understanding across three fundamental dimensions. Primarily, the theoretical framework of acrid opening coupled with bitter descending, along with the composition of BXD, demonstrates a strong correspondence to the central pathological mechanisms of gastric cancer. These mechanisms are characterized by spleen and stomach deficiency, a complex intermingled cold and heat, disrupted qi movement, and the convergence of phlegm, blood stasis, and toxic elements. Secondly, the therapeutic efficacy of BXD against gastric malignancies is defined by its capacity to act through multiple components, targets, and pathways. This includes modulating the inflammatory microenvironment, regulating immunity via the IL-8/STAT3/PD-1 axis, influencing the PI3K/AKT/mTOR signaling cascade, and triggering ferroptosis through the Nrf2/GPX4 pathway. Finally, the integration of BXD with conventional

DOI: 10.54254/2753-8818/2027.39354

chemotherapy offers significant clinical benefits by reducing adverse effects while boosting therapeutic outcomes, thereby enhancing both patient quality of life and immune competence.

Despite these findings, current literature exhibits notable discrepancies and constraints. The majority of mechanistic insights are extrapolated from in vitro and animal models, resulting in a scarcity of translational data applicable to human patients. Furthermore, clinical validation relies heavily on small-scale, single-center observational studies, while robust, large-scale multicenter randomized controlled trials are conspicuously absent. Additionally, the material foundation of bioactive constituents and their pharmacokinetic behaviors have not been thoroughly defined, nor have the specific mechanisms governing tumor hypoxia and immune modulation been completely unraveled. Future investigations should leverage advanced methodologies such as multi-omics, spatial transcriptomics, single-cell sequencing, and organoid technologies to delineate the network linking active metabolites, targets, and pathways associated with BXD. Concurrently, rigorous clinical trials are essential to facilitate the standardized and precise implementation of the acrid opening and bitter descending therapeutic strategy in gastric cancer management. prophylaxis and therapeutic intervention, thereby enabling this time-honored theoretical framework and its signature prescription to exert a more substantial influence within the contemporary holistic administration of gastric malignancy.

References

[1] Bray, F., Laversanne, M., Sung, H., Ferlay, J., Siegel, R. L., Soerjomataram, I., & Jemal, A. (2024). Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians, 74*(3), 229–263. https://doi.org/10.3322/caac.21834

[2] Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians, 71*(3), 209–249. https://doi.org/10.3322/caac.21660

[3] Wang, R., Huo, J., Zhang, H., et al. (2024). [Research progress on chemical components and pharmacological effects of Banxia Xiexin Decoction and prediction of quality markers]. *World Chinese Medicine, 19*(10), 1489-1496.

[4] Qu, Y., Zhu, L., Zuo, W., & Shen, H. (2021). [The experience of National Chinese Medicine Master Xu Jingfan in treating digestive tract tumors]. *China Journal of Traditional Chinese Medicine and Pharmacy, 36*(2).

[5] Ren, X., Zhang, M., Zhao, H., & Shi, Z. (2024). [Research progress on the mechanism of Banxia Xiexin Decoction in treating chronic atrophic gastritis]. *Journal of Liaoning University of Traditional Chinese Medicine, 26*(10).

[6] Yan, P., et al. (2026). Banxia xiexin decoction and its bioactive metabolites: Multi-targeted mechanisms for suppressing gastric cancer progression, reversing chemoresistance, and remodeling the tumor microenvironment. *Frontiers in Pharmacology, 17*, 1810848. https://doi.org/10.3389/fphar.2026.1810848

[7] Li, Y., et al. (2026). Integrative management of gastric cardia cancer and precancerous lesions: Prospects and mechanistic rationale for Banxia Xiexin Tang. *Frontiers in Pharmacology, 17*, 1763396. https://doi.org/10.3389/fphar.2026.1763396

[8] Jin, J., Cao, L., He, Q., et al. (2025). [Banxia Xiexin Decoction regulates CD8+ T cells via the IL-8-STAT3-PD-1 pathway to affect the malignant progression of gastric cancer]. *Chinese Archives of Traditional Chinese Medicine*.

[9] Feng, X., Xue, F., He, G., Ni, Q., & Huang, S. (2021). Banxia Xiexin Decoction inhibits the expression of PD-L1 through multi-target and multi-pathway regulation of major oncogenes in gastric cancer. *OncoTargets and Therapy, 14*, 3297–3307. https://doi.org/10.2147/OTT.S288442

[10] Feng, X., Xue, F., He, G., Ni, Q., & Huang, S. (2021). Banxia xiexin decoction affects drug sensitivity in gastric cancer cells by regulating MGMT expression via IL-6/JAK/STAT3-mediated PD-L1 activity. *International Journal of Molecular Medicine, 48*(2), 165. https://doi.org/10.3892/ijmm.2021.4998

[11] Li, Y., Li, L., Wang, X., Huang, H., & Han, T. (2024). Determining the mechanism of Banxia Xiexin Decoction for gastric cancer treatment through network analysis and experimental validation. *ACS Omega, 9*(9), 10119–10131. https://doi.org/10.1021/acsomega.3c06330

[12] Zu, G. X., Sun, K. Y., Liu, X. J., Tang, J. Q., Huang, H. L., & Han, T. (2024). Banxia xiexin decoction prevents the development of gastric cancer. *World Journal of Clinical Oncology, 15*(10), 1293–1308.

DOI: 10.54254/2753-8818/2027.39354

https://doi.org/10.5306/wjco.v15.i10.1293
[13] Zu, G. X., Tang, J. Q., Huang, H. L., & Han, T. (2025). Validation and analysis of key factors of Banxia Xiexin decoction against gastric cancer. *World Journal of Gastrointestinal Oncology, 17*(5), 104737. https://doi.org/10.4251/wjgo.v17.i5.104737
[14] Zu, G. X., Sun, K. Y., Liu, X. J., Tang, J. Q., Huang, H. L., & Han, T. (2025). [Mechanism of Banxia Xiexin Decoction against gastric cancer based on transcriptomics, network pharmacology and experimental validation]. *Chinese Journal of Modern Applied Pharmacy, 42*(15), 2598–2609.
[15] Li, L., Li, Y., Wang, X., Qiu, X., Guo, W., Huang, H., Liu, X., & Han, T. (2024). [Mechanism of Banxia Xiexin Decoction inducing ferroptosis in gastric cancer cells based on the Nrf2/GPX4 signaling pathway]. *Chinese Journal of Experimental Traditional Medical Formulae, 30*(6), 10–19.
[16] Su, H., Peng, C., & Liu, Y. (2024). Regulation of ferroptosis by PI3K/Akt signaling pathway: A promising therapeutic axis in cancer. *Frontiers in Cell and Developmental Biology, 12*, 1372330. https://doi.org/10.3389/fcell.2024.1372330
[17] Wang, H. (2021). [Effect of Banxia Xiexin Decoction combined with chemotherapy on hypoxia-inducible factor-1α, monocyte chemoattractant protein-1, endothelin-1 and immune function in patients with gastric cancer]. *Drug Evaluation, 18*(21), 1324–1326.
[18] Wang, S. (2023). *[Clinical observation of Banxia Xiexin Decoction combined with chemotherapy in postoperative gastric cancer patients and its effect on intestinal flora in tumor-bearing nude mice]* [Master's thesis]. Yangzhou University.
[19] Liu, L., & Chen, Y. (2023). [Experience of National Chinese Medicine Masters in differentiating and treating gastric cancer]. *China's Naturopathy, 31*(5).