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Article

Exploring the Economic Growth Poles and the New Productive Forces for Homology of Medicine and Food: Rational Non-Pharmaceutical Healing Consumption in the 21st Century

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Abstract: “Homology of medicine and food” embodies the Chinese nation’s unique wisdom, integrating nutritional and therapeutic functions to form a health philosophy centered on prevention, nourishment, and syndrome-based diet therapy. From the legend of Shennong to The Yellow Emperor’s Inner Canon, Sun Simiao’s Prescriptions , Li Shizhen’s Compendium, and modern scientific validation, this concept has shaped dietary practices, health preservation, and medical traditions for millennia. This study explores mud crab, rapeseed oil, and mugwort smoke as non-pharmaceutical healing resources, showing that they are both foundations of traditional Chinese medicine and emerging productive forces in modern life sciences. Mud crab demonstrates potential as a benchmark for high-quality fishery development when combined with biotechnology, ecological engineering, and systemic innovation across the value chain. Rapeseed oil benefits from rising health consumption, cultural recognition, and segmented demands for cardiovascular health, maternal and infant nutrition, anti-aging, sports, and beauty, especially under “clean label” trends. Mugwort smoke, as an extension of homology, integrates traditional wisdom with

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modern technology, with active components and mechanisms supporting antimicrobial, immunoregulatory, and preventive functions. With improved safety and standardization, it shows promise in precision medicine and preventive healthcare. These findings highlight how the philosophy of homology of medicine and food can evolve into new productive forces and growth poles for the 21st century, enhancing health literacy, advancing the health industry, and modernizing integrative healing systems..

Keywords: Homology of medicine and food; economic growth pole; new productive forces; non-pharmaceutical healing; mud crab; rapeseed oil; herbal inhalation

1. Problem Statement: Inheriting Homology of Medicine and Food for Modern Mind-Body Healing and Health Management

1.1 Historical Review: The Concept and Core Elements of Homology of Medicine and Food

In ancient times, as humans searched for food, they gradually discovered that certain plants and animals not only satisfied hunger but also relieved pain and even cured diseases. The discovery and use of food and medicine thus developed in parallel and intertwined. In China, both share the same theoretical foundation, rooted in traditional Chinese medicine's doctrines of yin-yang and five elements, zang-fu and meridians, the four properties and five flavors, and the dynamics of rising, descending, floating, and sinking. Their ultimate goal is also the same: to maintain balance of yin and yang, harmonize qi and blood, ensure proper organ function, and thereby achieve "treating before disease arises" and preventing the progression of illness.

The relationship between food and medicine has three main aspects. First, food is the basis of medicine: many medicines are themselves foods (such as yam, jujube, ginger, and coix seed) or derived from food (such as malt and germinated grains). Food, taken daily, is the safest and most acceptable form of "medicine." Second, medicine strengthens the function of food: medicines tend to have stronger, more pronounced effects (in terms of cold, heat, warmth, coolness, or intensity), and are primarily used to treat existing, more serious conditions. By contrast, food is milder, with gentler and longer-lasting effects, suitable for daily health maintenance and chronic adjustment. Third, the boundary is relative: traditional Chinese medicine describes food and medicine as having the same nature and principles. The key lies in use: when consumed for nourishment it is "food," but when applied to prevent or treat disease it becomes "medicine." The same substance may shift identity and function depending on dosage, preparation, and combination.

The guiding concepts rest on four aspects. First is the principle of "treating before disease," which emphasizes preventing illness through proper diet and represents the highest wisdom of health preservation. Second is "dietary therapy by syndrome differentiation," which tailors food choices to individual constitution (cold, hot, deficient, excessive), age, season, region,

and condition—just as medicine is prescribed based on differentiation. Third is “food as the foundation,” as described in the Huangdi Neijing: “Toxic herbs attack evils, the five grains nourish, the five fruits assist, the five livestock benefit, the five vegetables supply.” This underscores that while medicine combats disease, daily diet is the true basis of nourishment and vitality. Fourth is “moderation and balance,” calling for regular, balanced eating with harmonious flavors, avoiding excess and protecting the spleen and stomach as the postnatal foundation of health.

1.2 Theoretical Framework: An Overview of Classical Homology of Medicine and Food

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1.3 Major Discovery of the 21st Century: Homology of Medicine and Food as a New Productive Force

In the 21st century, "medicine and food sharing the same origin" has become a new productive force in health management, contributing in five key ways. First, it embodies preventive wisdom by strengthening the body through daily diet at minimal cost and maximum accessibility. Second, it realizes personalized health, aligning with precision medicine through syndrome-based dietary adjustments. Third, it enhances safety and compliance, as foods are milder and more acceptable for long-term use. Fourth, it sustains cultural heritage, representing a vital part of Chinese and global health traditions. Fifth, it drives innovation by integrating resources across agriculture, food, and medicine, providing fertile ground for industrial development and societal well-being.

2. Theoretical Framework: Classical Perspectives on Homology of Medicine and Food

2.1 Theories in Chinese Classics

The theory of "medicine and food sharing the same origin" is one of the core insights of traditional Chinese medicine, emphasizing the common origin, properties, and functions of food and medicine, as well as the concept of regulating the body and preventing disease through daily diet. Its essence lies in three aspects: common origin, common principles, and common use.

Common origin refers to the natural basis of both food and medicine, as they are all derived from the natural world—plants, animals, and minerals—and represent the essence of heaven and earth. The Huangdi Neijing states: "Toxic herbs attack pathogenic evils; the five grains nourish; the five fruits assist; the five livestock benefit; and the five vegetables supplement," highlighting that food and medicine together form the foundation for maintaining life. On a compositional level, many food ingredients also possess medicinal value. Examples include yam, goji berry, jujube, and ginger, which are consumed as regular foods and widely used as medicinal herbs.

Common principles involve the Four Properties and Five Flavors. Both food and medicine are classified by the "four properties" (cold, hot, warm, cool) and the "five flavors" (sour, bitter, sweet, pungent, salty), and they act to regulate the balance of yin and yang in the body. For instance, ginger is warm and pungent, dispersing cold and inducing sweating, whereas mung bean is cold and sweet, effective for clearing heat and detoxifying. The theory of meridian entry further specifies that food and medicine act on specific organs through certain channels; for example, hawthorn enters the spleen and stomach meridians to aid digestion, while pear enters the lung meridian to moisten dryness and relieve cough.

Common use emphasizes that dietary therapy comes first. Traditional Chinese medicine holds the principle of "when food therapy fails, then prescribe medicine," underscoring the preventive and nourishing role of diet (Qianjin Yaofang: "The foundation of health lies in food"). Medicine and food complement each other: medicines are often used to eliminate pathogens and treat illness, whereas food primarily supports and nourishes the body.

Together, they enhance therapeutic effects—for example, in treating qi and blood deficiency, herbs may be combined with food ingredients such as jujube or longan to strengthen the treatment.

2.2 Inheritance and Development of Classical Homology of Medicine and Food

From practice to theoretical system, the legend of Shennong tasting hundreds of herbs reflects how early humans distinguished the properties and effects of food and medicine through dietary practice. The Huangdi Neijing proposed a dietary structure of "the five grains nourish, the five fruits assist, the five livestock benefit, and the five vegetables supplement," establishing the foundation of dietary nourishment. The Shennong Bencao Jing recorded 365 medicinal substances, many of which served dual purposes as both food and medicine, such as coix seed and poria. In the Tang dynasty, the Shiliao Bencao became the first systematic monograph on dietary therapy, documenting the medicinal value of foods. The Yuan dynasty work Yinshan Zhengyao integrated Mongolian and Han medical knowledge, emphasizing dietary hygiene and palace dietary prescriptions. In modern times, the Chinese National Health Commission has issued the "List of Substances That Are Both Food and Medicine," identifying over 110 substances, including star anise, fennel, and honeysuckle, as suitable for dual use.

The concepts of syndrome-based dietary therapy and health preservation are deeply rooted in practice. For instance, individuals with yang-deficient constitutions are advised to consume warm foods such as lamb, longan, and chives while avoiding raw and cold foods. Those with yin deficiency should eat yin-nourishing, moistening foods such as white fungus, lily bulbs, and pears, while avoiding spicy foods. People with damp-heat constitutions benefit from heat-clearing, dampness-reducing foods such as coix seeds, adzuki beans, and bitter melon. Seasonal dietary guidance recommends nurturing the liver in spring with pungent and sweet foods like chives and cilantro to support yang energy; cooling and heat-relieving foods like watermelon and mung beans in summer to prevent heat-induced damage; moistening and tonic foods like pear, honey, and sesame in autumn to protect the lungs; and warming, yang-supportive foods like black beans, walnuts, and lamb in winter to strengthen the kidneys.

Dietary therapy for common ailments is based on symptoms to restore health. For early-stage colds, ginger with brown sugar water or scallion congee is recommended to expel cold and release the exterior. For indigestion, hawthorn, malt, or chicken gizzard-congee helps digest food, strengthen the spleen, and harmonize the stomach. For insomnia, sour jujube seed tea or lily and lotus seed congee nourishes the heart, calms the mind, and clears heat. For constipation, hemp seed, honey, or banana can moisten the intestines and promote bowel movement.

Classic medicinal food pairings include popular formulas such as Angelica and ginger lamb soup, which warms the center and supplements blood to treat postpartum cold deficiency, and the universally suitable Four-God Soup (poria, lotus seed, gorgon fruit, and yam), which strengthens the spleen and dispels dampness to nourish digestive function.

Regarding the therapeutic uses of specific items, the blue crab (especially the shell and crab roe) has three main applications: promoting blood circulation and removing blood stasis, used for injuries or retained lochia postpartum; strengthening and nourishing the body, with crab roe considered highly nutritious for fatigue or postpartum recovery; and external application to reduce swelling, where crushed shells are applied to relieve joint pain or abscesses.

Vegetable oil also has three therapeutic uses: moisturizing and protecting the skin, externally applied for dryness, mild burns, or diaper rash; promoting bowel movements when consumed in small amounts on an empty stomach; and dispersing wind and cold, where heated oil is used to massage joints to alleviate rheumatic pain.

Mugwort smoke has three main therapeutic functions: expelling pathogens and purifying the environment, traditionally believed to cleanse the air, repel insects, and remove "unfavorable energy"; warming the meridians and dispelling cold, where burning mugwort is used for cold-related abdominal pain or menstrual irregularities; and disinfecting and promoting health, as the smoke can suppress bacteria while supporting the body's yang energy.

2.3 Healing Functions of Mud Crab, Rapeseed Oil, and Mugwort Smoke

The therapeutic uses of the blue crab, particularly its shell and roe, can be categorized into three main applications. First, it is believed to promote blood circulation and remove blood stasis, with the shell traditionally used to treat bruises, injuries, and retained lochia postpartum. Second, it serves as a nourishing tonic, with crab roe considered highly nutritious for fatigue and postpartum recovery. Third, it can be applied externally to reduce swelling, where crushed shells are used to relieve joint pain or abscesses.

Vegetable oil also has three therapeutic applications. It can moisturize and protect the skin when applied externally, helping alleviate dryness, minor burns, or diaper rash. It can promote bowel movements when consumed in small amounts on an empty stomach, serving as a traditional remedy for constipation. Additionally, when heated and used to massage joints, it can disperse wind and cold, helping relieve rheumatic pain, similar to its use in "gua sha oil" treatments.

Mugwort smoke has three main therapeutic functions as well. It is used to expel pathogens and purify the environment, with the smoke believed to cleanse the air, repel insects, and remove negative energy. It warms the meridians and disperses cold, a practice in traditional Chinese medicine applied for cold-induced abdominal pain or menstrual irregularities. Finally, it has antibacterial and disinfectant properties, with the smoke capable of suppressing harmful microbes while supporting the body's yang energy.

3.Mud Crab: Homology of Medicine and Food and Modern Applications

3.1 Nutritional Components and Medicinal Value

The blue crab is a highly nutrient-dense seafood, rich in high-quality protein, omega-3 fatty acids, zinc, selenium, vitamin B12, and taurine, all of which contribute significantly to maintaining overall health, enhancing immunity, supporting growth and development, and

protecting cardiovascular function. In traditional Chinese medicine, it has been used to clear heat and detoxify, promote blood circulation and remove stasis, and nourish yin and strengthen bones. Modern research has also revealed multiple bioactive properties, including immune regulation, antioxidant effects, cardiovascular protection, and promotion of wound healing.

Nutritionally, blue crab is an excellent source of high-quality protein and a variety of trace nutrients. Its meat contains 15–20% protein by fresh weight, with a balanced profile of all eight essential amino acids, making it highly digestible and bioavailable. It is particularly rich in branched-chain amino acids (leucine, isoleucine, valine), which are vital for muscle growth and repair. The fat content in crab meat is relatively low (1–2%) but of high quality, containing unsaturated fatty acids, especially omega-3s (EPA and DHA), which support cardiovascular health, reduce inflammation, promote brain development, and maintain vision. While crab roe and crab fat are relatively high in cholesterol, moderate consumption is generally safe for healthy individuals, though those with hyperlipidemia or cardiovascular disease should monitor intake.

Mineral content is also noteworthy. Calcium and phosphorus support bone and dental health, aiding growth in children and preventing osteoporosis in older adults. Iron, mainly heme iron, is highly bioavailable and helps prevent iron-deficiency anemia. Zinc is abundant and plays a crucial role in enzyme synthesis, immunity, wound healing, reproductive health, and maintaining taste and smell. Selenium acts as a powerful antioxidant, protecting cells from oxidative damage, boosting immunity, and potentially lowering the risk of certain cancers. Other minerals such as copper, manganese, potassium, and magnesium participate in numerous physiological processes.

Blue crab is also rich in B vitamins, particularly vitamin B12 (cobalamin), niacin (B3), riboflavin (B2), and folate (B9), which are essential for energy metabolism, nervous system function, and red blood cell formation. Vitamin B12, predominantly found in animal foods, is well supplied by crab. Fat-soluble vitamins are also present, with crab roe and fat being rich in vitamin A (important for vision, skin, and immunity) and vitamin E (antioxidant), and modest amounts of vitamin D, which supports calcium and phosphorus absorption and bone health. Taurine is abundant and contributes to cardiac regulation, blood pressure control, antioxidant activity, bile secretion, and immune support. Chitin and chitosan in the shell, though not consumed directly, are widely used in supplements and medical applications for lipid regulation, immune enhancement, wound healing, and heavy metal adsorption. Polysaccharides in the crab may also provide immunomodulatory and antitumor effects.

Medicinally, the blue crab has both traditional and modern pharmacological value. In TCM, the meat, roe, and shell are classified as salty and cold, entering the liver and stomach meridians. Its primary functions include clearing heat and detoxifying, reducing swelling, and resolving abscesses, used for conditions such as boils, mastitis, erysipelas, and other heat-toxin syndromes. It can be applied externally as a poultice or combined with other detoxifying herbs internally. The crab also promotes blood circulation and alleviates pain, making it useful for bruises, swelling, lower back or limb pain, and rheumatic conditions. Its meat, being cold, is particularly suitable for heat-induced stasis or injuries with redness and

swelling. Traditionally, it is used postpartum for blood stasis and abdominal pain, though caution is advised for those with weakened postpartum constitutions.

The blue crab also nourishes yin and strengthens bones. Its high-quality protein and calcium-phosphorus content support recovery from musculoskeletal injuries, treat rickets in children, and assist in managing osteoporosis. Additionally, it has diuretic and dampness-removing effects, sometimes used to aid in conditions such as jaundice, under medical supervision.

Modern pharmacology supports many of these traditional uses. Proteins, zinc, selenium, taurine, and potential bioactive polysaccharides in the crab promote lymphocyte proliferation, enhance macrophage activity, and regulate cytokine secretion, improving immune function. Its antioxidant properties, derived from selenium, vitamin E, taurine, omega-3 fatty acids, and various peptides and polysaccharides, help eliminate free radicals, inhibit lipid peroxidation, and prevent oxidative stress-related diseases like cardiovascular and neurodegenerative disorders. Cardiovascular benefits are evident: omega-3s reduce triglycerides, inhibit platelet aggregation, and improve endothelial function, while taurine regulates cardiac contraction, prevents arrhythmias, and lowers blood pressure. Chitosan from the shell shows lipid-lowering potential.

Research also indicates possible antitumor activity, with crab polysaccharides, peptides, and saponins promoting apoptosis, inhibiting proliferation, and enhancing immune surveillance in cancer cells, primarily demonstrated in vitro or in animal models. Blue crab further supports wound healing and tissue repair due to its high-quality protein, zinc, and chitosan, which provide essential building blocks, enzymatic cofactors, and scaffolding for tissue regeneration. Other potential benefits include blood sugar regulation and hepatoprotective effects, with some compounds showing protective activity against chemical-induced liver injury.

3.2 The Past and Present of Mud Crab in Medicine and Food

The blue crab (Scylla serrata), also known as the serrated mud crab or “fat crab,” is a large economic crab species widely distributed in tropical and subtropical seas. In southeastern China and Southeast Asia, the blue crab is not only an important aquaculture species but also a quintessential example of the “medicine and food homology” concept, valued for both its unique nutritional properties and medicinal effects. Its historical and contemporary significance reflects the wisdom of traditional Chinese medicine while also demonstrating modern science’s validation and development of traditional knowledge.

In classical texts and early applications, the Compendium of Materia Medica (Bencao Gangmu) laid the foundation for its medicinal recognition. Although Li Shizhen did not specifically name the blue crab in the Ming dynasty text, the entry for “crab” noted: “Crabs, broad-bodied arthropods… salty, cold, slightly toxic. Treat heat and pain in the chest, resolve stasis and promote blood circulation, aid in healing skin eruptions, nourish sinews and boost energy.” As a type of marine crab, the blue crab’s properties—salty and cold, entering the liver and stomach meridians—were incorporated into the traditional pharmacological system. Qing dynasty works such as Bencao Gangmu Shiyi and Suixi Ju Yinshi Pu further elaborated

on the medicinal use of crabs, emphasizing that "marine crabs" are particularly effective in clearing heat, detoxifying, and promoting blood circulation.

Coastal folk practitioners often used blue crab for postpartum recovery, cooking crab roe and meat into soups to replenish qi and blood and promote lactation, as crab roe is rich in phospholipids and iron. It was also applied to bruises and injuries, with dried crab shells ground into powder for external application to activate blood circulation and reduce swelling, leveraging chitin's wound-healing properties. Additionally, it was used to address damp-heat jaundice, with crab meat combined with herbs such as Yin Chen and Gardenia to clear heat and remove dampness. In the cultural context of medicine-food homology, the principle of "using form to nourish form" highlighted the plumpness of crab roe and meat, which was believed to tonify yin and the kidneys, benefiting male kidney deficiency and female postpartum weakness. Regions such as Fujian and Guangdong developed characteristic medicinal dishes like "blue crab stewed with yam" and "blue crab glutinous rice porridge," used for post-illness recovery and gastrointestinal weakness, exemplifying the lifestyle wisdom of integrating food and medicine.

Modern applications of blue crab in the medicine-food homology framework include functional food development. For instance, crab roe capsules extract astaxanthin and phospholipids for eye protection and fatigue reduction. Chitosan calcium tablets, made from crab shells, have been developed as highly absorbable calcium supplements. Ready-to-eat tonic soups combine medicinal culinary recipes into convenient "blue crab medicinal canned foods" for postoperative nutrition. Clinical nutritional support also employs hydrolyzed blue crab protein (small peptides) in enteral nutrition formulations, which are easily digested and absorbed, suitable for patients with impaired gastrointestinal function.

3.3 Development and Utilization of New-Quality Productive Forces in Swimming Crab

The development and utilization of new-quality productive forces in swimming crab refer to promoting the transformation of the industry from traditional aquaculture to intelligent, green, efficient, and high–value-added modes through technological innovation, model reform, and factor upgrading. This process is not only crucial for enhancing industrial competitiveness but also represents an important pathway for advancing fisheries modernization and supporting rural revitalization.

In terms of technological innovation, the focus should be on seed industry innovation, smart aquaculture, and disease prevention. Seed industry innovation includes applying genomics and molecular breeding technologies to cultivate superior varieties with faster growth, stronger disease resistance, better meat quality, and higher tolerance to intensive farming, as well as developing sex control technologies to increase the proportion of male crabs with higher economic value, and establishing germplasm banks to protect wild genetic diversity. Smart aquaculture relies on the Internet of Things and precision monitoring to track water quality and environmental parameters, AI-based intelligent feeding systems to reduce feed waste, automated management equipment to improve efficiency, and virtual aquaculture models to optimize strategies and lower risks. Meanwhile, strengthening disease prevention

involves developing rapid detection kits, promoting green alternatives such as probiotics and plant extracts, researching vaccines and immune enhancers, and adopting ecological aquaculture models like integrated multi-trophic systems and rice–crab symbiosis.

At the level of industrial integration and value upgrading, it is important to promote factory-based recirculating aquaculture systems (RAS), which allow high-density, high-yield, and environmentally controlled farming while saving land and water and reducing pollution. RAS requires efficient water treatment, renewable energy utilization, and intelligent control, making it a model for new-quality productive forces, especially in regions with scarce land or for high-end markets. In addition, deep-sea intelligent aquaculture should be developed through wave-resistant deepwater cages, farming vessels, and semi-submersible platforms equipped with automated feeding, monitoring, and harvesting systems, which take advantage of pristine offshore waters to produce premium "deep-sea crabs."

For industrial chain extension and deep processing, attention should be paid to high–value-added products such as fresh-keeping crab, seasoned crab, crab powder, crab roe paste, and crab sticks. Functional foods and nutraceuticals can be developed by extracting chitin, chitosan, and astaxanthin from crab shells for health supplements and cosmetic ingredients. Bioactive substances such as antimicrobial peptides and lysozyme also have potential applications in medicine and agriculture. By-products should be comprehensively utilized, with crab shells processed into chitosan and crab viscera used to extract oils or enzymes, striving for "zero waste." At the same time, building cold chain logistics from farm to table and establishing regional public brands, such as "Sanmen Swimming Crab" and "Yangjiang Roe Crab," can enhance premium pricing power.

In terms of tertiary industry integration and the experiential economy, recreational fisheries should be developed, including crab-themed tourism, fishing, science education, and culinary experiences. E-commerce and new retail models, such as live-streaming sales, community group purchases, and customized pre-sales, can shorten circulation chains and enhance consumer experience. Cultural empowerment should also be emphasized, with local festivals and folklore used to enrich the cultural connotations of crab branding.

Finally, in support system construction, digitalization and data integration are key. A full-chain data system covering breeding, farming, processing, circulation, and consumption can provide market forecasting, risk warnings, and policy support. Full traceability from hatchery to table can improve consumer trust and ensure food safety. The industry should also transition toward green and low-carbon practices by adopting renewable energy, quantifying carbon emissions, exploring carbon-sequestering fisheries and low-carbon certifications, enforcing wastewater standards, and promoting recycling technologies. At the same time, it is essential to cultivate "new crab farmers" skilled in smart equipment, data analysis, and green technologies, and to establish innovation centers linking enterprises, universities, and research institutes to accelerate technology transfer. Industrial cooperatives and alliances should be developed to improve organization and bargaining power. Policy and financial support should be strengthened through subsidies, tax incentives, specialized financial instruments, and the formulation of standards and technical norms for smart aquaculture, green products, and deep processing.

4.Medicinal and Culinary Uses of Rapeseed Oil

4.1 Nutritional Characteristics and Health Benefits of Rapeseed Oil

Rapeseed oil, also known simply as canola oil, is one of the most widely used cooking oils globally, especially prevalent in Asia, Europe, and North America. Its nutritional characteristics and health benefits mainly depend on its fatty acid composition, trace nutrients, and processing methods. Rapeseed oil is rich in oleic acid, comparable to olive oil, which is beneficial for cardiovascular health. The ratio of linoleic acid to alpha-linolenic acid is well-balanced, making it a nutritionally balanced oil. Its vitamin E content is sufficient for daily use. Although minor components such as plant sterols and polyphenols are present in smaller amounts, long-term consumption can still provide health benefits.

Regarding its nutritional profile, the fatty acid composition is a core advantage. First, it contains a high level of monounsaturated fatty acids (MUFA), primarily oleic acid (Omega-9), accounting for over 60%, close to olive oil (~70%), which helps lower "bad" LDL cholesterol while maintaining "good" HDL cholesterol levels. Second, it has a balanced amount of polyunsaturated fatty acids (PUFA), mainly linoleic acid (Omega-6) at around 20%, an essential fatty acid, though excessive intake may be pro-inflammatory. Third, alpha-linolenic acid (Omega-3) accounts for about 9–12%, making rapeseed oil an important plant-based source of Omega-3 with anti-inflammatory and cardiovascular protective effects. Fourth, it is low in saturated fatty acids (SFA), about 7%, much lower than palm oil (50%), coconut oil (90%), and lard (40%). Fifth, it contains very low erucic acid (<2%), whereas traditional rapeseed oil could contain 20–50%, which may be harmful to the heart. Modern low-erucic rapeseed oil (Canola) has been bred to meet international safety standards (<2%). Sixth, it contains trace nutrients, including vitamin E—rich in tocopherols, especially γ-tocopherol, which has antioxidant effects protecting cells from free radical damage. It also contains plant sterols, such as β-sitosterol, which can competitively inhibit cholesterol absorption and help lower blood lipids, and polyphenols, such as glucosinolate breakdown products (isothiocyanates), which have anti-inflammatory and potential anticancer effects, although some may be lost during refining. Additionally, rapeseed oil has a high smoke point (190–230°C for refined oil), making it suitable for high-temperature cooking like frying, stir-frying, and sautéing, without producing harmful compounds.

In terms of health benefits, rapeseed oil primarily protects cardiovascular health. Its combination of high oleic acid and low saturated fat can significantly reduce LDL cholesterol ("bad" cholesterol) and lower the risk of atherosclerosis. Omega-3 (alpha-linolenic acid) can inhibit platelet aggregation and prevent thrombosis. It may also help regulate blood pressure when replacing saturated fats in the diet. Omega-3 has anti-inflammatory effects, as it can be converted to EPA and DHA in the body (albeit inefficiently), inhibiting inflammatory factors such as TNF-α and IL-6, and alleviating chronic inflammation-related diseases such as arthritis. It also supports metabolic health and improves insulin sensitivity; monounsaturated fats help regulate blood glucose and reduce the risk of type 2 diabetes. Rapeseed oil is beneficial for weight management, being less likely than high-saturated-fat oils to contribute

to abdominal obesity. Its antioxidant components, vitamin E and plant sterols, help scavenge free radicals, protect cells from oxidative damage, and may reduce the risk of cancers such as breast and colon cancer. Finally, Omega-3 supports brain health as an important component of neural cell membranes, and long-term intake may improve cognitive function and help prevent neurodegenerative diseases like Alzheimer's.

4.2 Rapeseed Oil in Healthy Cooking and Foodservice Management

Rapeseed oil, as a widely used plant-based oil, plays an important role in healthy cooking and foodservice management. Its unique nutritional profile, cooking properties, and affordable price make it a common choice for both home kitchens and the catering industry. In terms of nutritional characteristics and health benefits, rapeseed oil has several advantages in fatty acid composition. It is high in monounsaturated fatty acids (MUFA), accounting for approximately 60–65%, primarily oleic acid, which helps lower "bad" LDL cholesterol, maintain "good" HDL cholesterol, and prevent cardiovascular disease. It contains moderate amounts of polyunsaturated fatty acids (PUFA), including about 20–30% linoleic acid (Omega-6) and around 10% alpha-linolenic acid (Omega-3), the latter being an essential fatty acid beneficial for brain health and anti-inflammatory effects. Its saturated fat content is low, around 7%, much lower than coconut oil or palm oil, aligning with healthy diet guidelines. Modern low-erucic varieties (such as "double-low" rapeseed oil) contain less than 2% erucic acid, reducing potential cardiovascular risks associated with traditional high-erucic oils. Rapeseed oil is also rich in vitamin E (tocopherols), providing antioxidant protection against free radical damage, and contains plant sterols, which help inhibit cholesterol absorption.

In healthy cooking applications, rapeseed oil is highly versatile. Its high smoke point—refined oil around 230–240°C—makes it suitable for frying, stir-frying, baking, roasting, and other high-temperature cooking methods, reducing smoke and harmful compound formation. Its neutral flavor does not overpower the natural taste of ingredients, making it suitable for Chinese stir-fries, Western baking, and cold dishes (using cold-pressed or extra-virgin oil). Rapeseed oil also has good stability, resisting oxidation and extending food shelf life. Specific cooking scenarios include: Chinese stir-fry, enabling quick high-heat cooking while keeping dishes light; frying, for foods like fried chicken and French fries, with temperature control (below 180°C) and limited reuse; baking, as a butter substitute to reduce saturated fat in cakes and cookies; cold dishes and salads, using cold-pressed oil to retain nutrients and flavor; and sauces or dressings, providing smooth texture without overpowering flavors.

In foodservice management, rapeseed oil provides several benefits. First, it optimizes cost efficiency. Second, it is affordable compared to premium oils like olive or avocado oil, suitable for bulk purchasing. Third, it is multifunctional—usable for frying, sautéing, and baking—reducing inventory variety and management costs. Fourth, it has high utilization efficiency, with lower loss rates than more oxidation-prone oils such as sunflower oil. Fifth, it supports dish standardization and quality control: its neutral taste ensures consistent flavor, while its high smoke point accommodates high-heat kitchen operations, improving service efficiency.

4.3 Non-Pharmacological Healing and Wellness of Rapeseed Oil

Non-pharmacological healing emphasizes promoting health, preventing disease, supporting recovery, and enhancing physical and mental well-being through lifestyle, diet, and natural therapies rather than medications. Rapeseed oil finds multiple applications in this domain. First, it supports cardiovascular health. Used as a daily cooking oil, it can replace oils high in saturated fats (such as butter, lard, and palm oil). Its high monounsaturated fatty acid (MUFA) content and favorable fatty acid profile help regulate blood lipids and reduce the risk of atherosclerosis.

Second, it serves as an adjunct for health management. For individuals with dyslipidemia or at risk of hypertension, rapeseed oil can be incorporated under the guidance of healthcare professionals into healthy dietary patterns, such as the Mediterranean diet or DASH diet, as part of long-term supportive nutrition. Third, it provides anti-inflammatory and immune support. For those experiencing chronic low-grade inflammation—linked to various chronic diseases—or needing immune enhancement, rapeseed oil can be integrated into an anti-inflammatory dietary strategy. It may help alleviate symptoms of inflammatory conditions such as arthritis, in conjunction with broader medical interventions.

Fourth, it contributes to metabolic health support. Fifth, it assists in blood sugar management; its stable MUFA energy source and low glycemic impact help maintain steady blood glucose levels, making it a suitable oil for individuals with diabetes or prediabetes. Sixth, it aids weight management by providing healthy fats that promote satiety, helping control overall caloric intake and supporting weight management plans.

Seventh, rapeseed oil benefits skin health and external applications. Internally, its vitamin E and essential fatty acids are crucial for maintaining skin barrier function, hydration, and anti-aging. Consuming high-quality rapeseed oil may improve skin dryness and elasticity. Externally, unrefined or cold-pressed rapeseed oil can be used as a base or carrier oil in aromatherapy and natural skincare, ideal for massage, facial care, or body oil applications due to its gentle, skin-friendly, and nutrient-rich properties. It also provides moisturizing and reparative support when applied directly to dry, rough, or mildly inflamed skin (e.g., during eczema or dermatitis remission), though a patch test is recommended.

Eighth, it supports hair care when used in hair masks or conditioners, nourishing hair and improving dryness or frizz. Finally, it offers gentle digestive support. Its lubricating properties and mild nature can help relieve minor constipation, promoting intestinal motility as part of a healthy diet, making it beneficial for individuals with sensitive digestive systems.

5.Mugwort Smoke (Ai Smoke) in Medicinal and Modern Applications

5.1 Composition and Pharmacological Effects of Ai Smoke

Mugwort leaves are the core of Ai smoke, and when burned, the smoke contains chemical constituents of the leaves that are decomposed, transformed, volatilized, or newly generated under high temperatures. Essential oils are the most characteristic components of mugwort, contributing to the fragrance of Ai smoke and some of its medicinal effects. During

combustion, these volatile compounds are released into the smoke. Components such as cineole, camphor, borneol, thujone, terpinen-4-ol, camphene, limonene, apiol, and eugenol give Ai smoke its unique aroma and exhibit antibacterial, antiviral, anti-inflammatory, antitussive, expectorant, sedative, and insect-repelling activities. These compounds act on the human body via smoke and heat.

Mugwort also contains various flavonoids, including quercetin, kaempferol, isorhamnetin, apigenin, luteolin, and their glycosides. Flavonoids are potent antioxidants with anti-inflammatory, anti-allergic, immune-regulating, and cardiovascular-protective effects, forming a key basis for the "warming and unblocking" effects of Ai moxibustion. The leaves contain tannins, which may convert into other phenolic compounds upon burning, providing astringent, hemostatic, antibacterial, and antiviral properties. Polysaccharides in mugwort demonstrate immune-modulating, anti-tumor, and antioxidant activities. Organic acids such as chlorogenic acid, caffeic acid, and ferulic acid contribute antioxidant, anti-inflammatory, and antimicrobial effects. Ai smoke also provides trace elements like calcium, potassium, magnesium, iron, manganese, zinc, and selenium, all essential for physiological processes. Other constituents include sterols, triterpenes, ketones, and coumarins.

Functional additives in moxibustion smoke are generally categorized into four types. First, warming and dispersing cold, including cinnamon, dried ginger, aconite, asarum, clove, and evodia, containing essential oils and alkaloids. Second, blood-activating and stasis-resolving herbs, such as frankincense, myrrh, safflower, and Chuanxiong, containing resins, essential oils, flavonoids, and alkaloids. Third, aromatic and orifice-opening agents, like musk (artificial), borneol, and styrax, rich in volatile compounds. Fourth, other functional herbs for wind-dampness removal, heat clearing, and detoxification.

Clinically, Ai smoke can assist in pain management, including knee osteoarthritis and lumbar strain, showing superior analgesic effects compared to physical therapy alone. In gynecological conditions, moxibustion at points such as Guanyuan and Sanyinjiao can improve dysmenorrhea and menstrual irregularities, likely through modulation of prostaglandin secretion. In rehabilitation, combined with acupuncture, it may aid post-stroke neurological recovery. For prevention and wellness, seasonal moxibustion (e.g., Sanfu or Sanjiu moxibustion) can enhance immunity, prevent colds and allergic diseases, and alleviate fatigue or insomnia by improving microcirculation. Technological innovations include smart moxibustion devices for temperature control and smoke filtration, and extraction of mugwort components for essential oils or antimicrobial sprays for environmental or skincare applications.

5.2 Traditional Medical Applications of Ai Smoke

In traditional "medicinal-food homology," mugwort clearly demonstrates both medicinal and dietary properties. Artemisia argyi has historically been used as both food and medicine. The Jingchu Suishi Ji records eating "Ai rice cakes" during Qingming, and the Compendium of Materia Medica notes that mugwort leaves can be boiled for food or made into powders or pills to warm the middle, dispel cold, and regulate the spleen and stomach. In traditional

medicine, Ai leaves are considered warm in nature, bitter and pungent in taste, and enter the liver, spleen, and kidney meridians, providing warming, hemostatic, cold-dispersing, pain-relieving, damp-eliminating, and itch-relieving effects. When burned, Ai smoke is seen as a vehicle that elevates these medicinal properties.

The "medicinal vapor" theory of Ai smoke emphasizes two points. First, the penetration of medicinal vapor: according to traditional theory, the smoke penetrates the skin and acupuncture points to exert therapeutic effects (Wai Tai Mi Yao notes: "Moxibustion fire penetrates meridians, driving out external pathogens"). Second, balancing yin and yang: the warm nature of Ai smoke disperses cold-dampness and harmonizes qi and blood, particularly suitable for individuals with cold-deficient constitutions, such as those with menstrual cold or arthritis.

The use of Ai smoke in the Zen tradition originated with Master Zhizhe. During the Sui-Tang period, frequent damp conditions in Tiantai Mountain caused monks and devotees to develop rheumatism and cold-related ailments. Master Zhizhe discovered locally grown Tiantai "Hai Ai" with thick leaves and potent medicinal properties. Combining moxibustion principles with Buddhist incense rituals, he first produced mugwort incense for use in meditation halls and ceremonies. Its therapeutic mechanism involved volatile compounds like cineole and camphor that disinfected the air and calmed the nervous system, paired with chanting to regulate breathing and achieve mind-body balance.

Records from the Ming dynasty (Tiantai Shan Fangwai Zhi) describe monks at Guoqing Temple producing incense from mountain mugwort to dispel miasma and calm the mind. Tang dynasty monks known as "Medicine Kings" further innovated by combining Ai with local herbs to produce "healing incense," used in ceremonies to relieve pain. Over time, this practice spread to the general public, forming the Tiantai Ai incense tradition. Even today, locals maintain customs of burning Ai incense during Dragon Boat Festival to repel diseases. Historically, Artemisia argyi is a warm medicinal herb; the Compendium of Materia Medica records its effects as "warming the middle, dispelling cold, and removing dampness." Modern studies confirm Ai smoke components such as thujone have antibacterial and anti-inflammatory effects, improve respiratory function, and reduce anxiety. Tiantai Mountain's Guoqing Temple, with abundant medicinal resources, preserves classical texts like Bei Ji Qian Jin Yao Fang, supporting Ai incense research. Locally grown "Hai Ai" contains higher essential oil levels than ordinary mugwort, making it ideal for incense. Traditional production methods, such as "nine steaming and nine drying," are still used to create meditation and wellness incense, and the temple continues to burn Ai incense in major ceremonies, integrating ritual, purification, and wellness into spiritual practice.

5.3 Modern Health Management Applications of Ai Smoke

Modern research emphasizes the bioactive properties of Ai smoke, rich in volatile compounds like cineole, camphor, and borneol, as well as phenolic acids and flavonoids such as caffeic acid and quercetin. Its pharmacological effects include three main areas: first, antibacterial and antiviral activity, inhibiting pathogens such as Staphylococcus aureus and

E. coli in vitro; second, anti-inflammatory and analgesic effects, with Ai polysaccharides inhibiting pro-inflammatory cytokines TNF-α and IL-6; third, immune modulation, activating macrophages and enhancing immunity.

Culturally, Guoqing Temple in Tiantai Mountain served as both a religious center and a carrier of traditional Chinese medicine. Mugwort incense combines ritual and medicinal functions. Historical exchanges, such as those by Jianzhen in the 8th century, transmitted Ai and related Buddhist medical practices to Japan, where it evolved into Japanese "mugwort incense" (mugusa senko) and floral-scented variants used in relaxation, sleep improvement, and the Japanese incense culture.

Modern opportunities include developing nicotine-free herbal smoke products that align with global tobacco harm-reduction policies. Ai floral smoke is free from nicotine, leveraging natural herb advantages with potential antibacterial, anti-inflammatory, and respiratory-supporting effects. Target audiences include smokers seeking safer alternatives, wellness enthusiasts, young trend-seekers, and middle-aged or elderly individuals pursuing sleep and joint health. Technological innovations involve low-temperature atomization (non-combustion) to reduce harmful emissions and functional enhancements with probiotics or vitamins. Branding can integrate Guoqing Temple heritage to create "Eastern Zen wellness" narratives.

6.Conclusion and Outlook

Looking to the future of medicinal-food homology, blue crabs combine high nutritional and functional value with traditional effects of nourishing yin, tonifying the kidney, and promoting blood circulation. Extracts show antioxidant, anti-tumor, and immune-enhancing activities. Applications include functional foods, chitin/chitosan from shells as dietary fiber or immune modulators, and crab protein peptides in sports nutrition. Active ingredients have potential in pharmaceutical excipients or wound healing materials, while high-value aquaculture supports the blue economy.

Rapeseed oil is both a source of healthy fats and functional compounds, rich in oleic acid, vitamin E, plant sterols, and polyphenols. Traditional uses emphasize detoxification and bowel regulation, while modern applications highlight cholesterol reduction, anti-inflammation, and cardiovascular protection. Future directions include mainstreaming low-erucic acid varieties for "three reductions" (salt, oil, sugar) diets and developing functional oils enriched with polyphenols or sterols for metabolic syndrome prevention.

Ai smoke combines traditional fumigation therapy with modern air purification. It supports moxibustion therapy with warming, cold-dispelling, antibacterial, and antiviral effects, and its non-smoking applications include environmental sterilization, where volatile compounds inhibit airborne pathogens, and aromatherapy for stress relief and sleep improvement using mugwort essential oil.

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