

# Integrating complementary and alternative medicine with modern medicine - a scientific rationale for better quality of life, reduced side-effects, and organ function preservation

## Abstract

Modern medicine has achieved remarkable success in the diagnosis and treatment of acute illness and many chronic diseases. However, a substantial proportion of patients continue to experience persistent symptoms, treatment-related adverse effects, reduced quality of life (QoL), polypharmacy, and progressive end-organ damage despite guideline-directed care. These gaps are particularly evident in chronic non-communicable diseases, psychosomatic disorders, cancer survivorship, functional syndromes, and ageing populations. This comprehensive review examines the scientific rationale, mechanistic pathways, and clinical evidence supporting the integration of selected complementary and alternative medicine (CAM) modalities with modern medicine to improve quality of life, reduce treatment-related side effects, preserve organ function, and enhance overall patient-centred care.

A narrative integrative review was conducted synthesising evidence from systematic reviews, meta-analyses, randomised controlled trials, observational studies, and authoritative guidelines across multiple CAM disciplines. Modalities reviewed include Yoga, Ayurveda, Tai Chi, Qigong, acupuncture, acupressure, cupping therapy, chiropractic, osteopathy, homeopathy, and naturopathy, and hypnotherapy, and mind-body medicine. Evidence was mapped to mechanistic domains, clinical indications, patient-reported outcomes, safety considerations, and disease-specific integrated care pathways. Across diverse modalities, consistent benefits were identified in domains central to chronic disease management, including autonomic nervous system regulation, reduction of low-grade inflammation, modulation of central pain processing, optimisation of lifestyle and behavioural determinants of health, and enhancement of psychosocial resilience. Integrated approaches were associated with improvements in QoL, pain, fatigue, sleep, emotional wellbeing, functional capacity, and treatment adherence. Importantly, these benefits frequently translated into reduced medication burden and mitigation of treatment-related adverse effects, indirectly supporting long-term organ function preservation. Disease-specific integrative pathways demonstrated particular relevance in cardiovascular disease, metabolic disorders, chronic pain, gastrointestinal functional disorders, oncology supportive care, mental health conditions, long-COVID syndromes, and frailty in older adults. When practised within robust clinical governance frameworks and used as adjuncts—not alternatives—to evidence-based medical care, integrative medicine offers a scientifically plausible, ethically sound, and patient-centred strategy to address unmet needs in modern healthcare. Integrated medicine represents an evolution toward whole-system, prevention-oriented care that prioritises functional health, resilience, and long-term organ function preservation alongside disease control.

**Keywords:** complementary and alternative medicine, quality of life, cardiovascular disease, metabolic disorders, chronic pain

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## Introduction

Modern biomedicine has transformed global health outcomes through advances in diagnostics, pharmacotherapy, surgery, and public health. Mortality from acute infections, cardiovascular emergencies, and many cancers has declined significantly over recent decades. Nevertheless, healthcare systems worldwide face a growing burden of chronic disease, multimorbidity, mental health disorders, functional syndromes, and age-related decline. In these contexts, disease-specific treatments often succeed in controlling biochemical or radiological markers but fail to fully restore patient wellbeing, functional capacity, or long-term physiological resilience. A substantial proportion of patients report persistent symptoms such as pain, fatigue, sleep

disturbance, anxiety, depression, and reduced physical function despite optimal medical management. Polypharmacy, treatment intolerance, and cumulative medication toxicity further complicate care, particularly in older adults and those with multiple long-term conditions. These realities highlight a critical gap between disease-centred care and person-centred outcomes, prompting increasing interest in integrative approaches that address the whole patient rather than isolated pathologies.

Integrated medicine refers to the intentional, evidence-informed combination of modern medical practice with selected complementary and alternative medicine (CAM) modalities to optimise health outcomes.<sup>1</sup> It differs fundamentally from “alternative

medicine” by maintaining modern diagnostics, pharmacology, and clinical governance as the foundation of care, while incorporating complementary interventions as supportive, adjunctive strategies. Rather than representing a single therapeutic system, integrated medicine is a clinical framework that prioritises multimodal, personalised, and preventive care. Its core objectives include improving quality of life, reducing symptom burden, minimising treatment-related side effects, supporting long-term organ function preservation, and enhancing patient engagement and self-management.

Despite their diverse historical origins, many CAM modalities converge on common biological and psychophysiological mechanisms increasingly recognised in modern science. These include regulation of the autonomic nervous system, modulation of stress-related neuroendocrine pathways, reduction of chronic low-grade inflammation, optimisation of metabolic and immune function, and modification of central pain and symptom processing. Lifestyle and behavioural determinants—such as physical activity, sleep, nutrition, stress regulation, and emotional resilience—emerge as dominant drivers of chronic disease progression and healthcare utilisation. Modern medicine excels at targeting downstream disease mechanisms, while many integrative modalities act upstream on these regulatory systems. When combined thoughtfully, these approaches are not competitive but complementary, addressing different layers of the disease process across biological, psychological, and social domains.<sup>1</sup>

This article synthesises evidence across a broad range of integrative disciplines commonly accessed by patients and increasingly incorporated into mainstream care.

**I. Movement and mind–body practices:** Yoga, Tai Chi, Qigong

**II. Traditional systems and lifestyle medicine:** Ayurveda, naturopathy

**III. Physical and neuro-modulatory therapies:** Acupuncture, acupressure, cupping, chiropractic, osteopathy

**IV. Regulatory and psychosomatic therapies:** Hypnotherapy and mind–body medicine

**V. Individualised complementary approaches:** Homeopathy

Each modality is examined not in isolation, but in relation to shared mechanisms, clinical indications, safety considerations, and measurable outcomes relevant to modern healthcare priorities.

A central premise of this review is that **quality of life is a legitimate and essential clinical endpoint**, not a secondary or subjective consideration. Improvements in pain, fatigue, sleep, mood, mobility, and self-efficacy strongly influence treatment adherence, functional independence, healthcare utilisation, and long-term outcomes. Similarly, reduction of treatment-related side effects represents a critical but often overlooked therapeutic goal. Integrative interventions may reduce symptom amplification, enhance physiological reserves, and improve coping capacity, thereby enabling rationalisation of medication regimens in selected patients. Over time, this dose-sparing and symptom-modulating effect contributes to organ function preservation, defined not as organ regeneration but as the slowing of functional decline and prevention of iatrogenic harm.

To translate theory into clinical relevance, this article presents disease-specific integrated care pathways across major chronic disease domains, including cardiovascular disease, metabolic disorders, chronic pain, gastrointestinal functional syndromes, oncology supportive care, mental health conditions, long-COVID syndromes,

respiratory disease, and frailty. These pathways emphasise tiered integrative interventions, objective monitoring, patient-reported outcomes, and explicit stop rules to ensure safety and ethical practice. Combining modern medicine with complementary and alternative medicine for chronic diseases is a useful action that helps patients care now and future generation.<sup>2</sup>

In this article we provide a scientifically grounded, clinically pragmatic, and policy-relevant framework for integrated medicine, demonstrating how complementary therapies can be responsibly incorporated into modern healthcare to enhance quality of life, reduce treatment-related harm, and support long-term organ health. By synthesising evidence across modalities and mapping them to real-world clinical pathways, this review seeks to inform clinicians, educators, researchers, and policymakers about the role of integrated medicine in the future of patient-centred care.

## Integrating yoga and Ayurveda with modern medicine

Modern medicine has transformed outcomes for acute illness and many chronic diseases, yet patients frequently experience residual symptoms, treatment-related adverse effects, polypharmacy, and progressive end-organ damage despite guideline-directed care. Integrating evidence-informed Yoga and Ayurveda with conventional diagnosis and therapeutics offers a plausible, patient-centred strategy to improve quality of life (QoL), reduce symptom burden, and support long-term organ function preservation through complementary mechanisms. Yoga interventions—typically combining postures (asana), regulated breathing (pranayama), and meditation/relaxation—have demonstrated benefits across multiple chronic conditions, including improvements in depression, fatigue, blood pressure, glycaemic outcomes, and autonomic balance.<sup>3–12</sup> Ayurveda contributes a personalised lifestyle framework (dinacharya/ritucharya), dietary individualisation, behavioural medicine, mind–body practices, and selected botanicals with biologically plausible anti-inflammatory, antioxidant, immunomodulatory, and metabolic effects, though quality of evidence varies by indication and product.<sup>13–15</sup>

Chronic pain management and comprehensive approach of Ayurveda with Modern medicine has been described and appreciate in the literature.<sup>16</sup>

When implemented with safety governance—especially herb–drug interaction vigilance and quality assurance—integrative care may reduce medication side-effects indirectly (through improved symptom control and reduced dose requirements) and directly (via supportive care that mitigates stress, inflammation, and dysautonomia).<sup>14,17,18</sup>

This article synthesises mechanisms, clinical evidence, and practical integration pathways to support high-quality, ethical, and measurable integrative patient care.

## Why integration is needed - the “residual burden” of chronic disease

Chronic disease care increasingly succeeds at prolonging life, but many patients live with persistent fatigue, sleep disturbance, anxiety/depression, pain syndromes, metabolic dysregulation, and medication adverse effects that impair function and QoL. Evidence syntheses indicate Yoga can improve multiple patient-reported and physiological endpoints across chronic conditions, with particularly consistent signals for mental health, fatigue, cardiometabolic risk markers, and stress physiology.<sup>4,5</sup> These outcomes matter clinically because they influence adherence, self-efficacy, lifestyle change uptake, relapse rates, and the cumulative allostatic load that accelerates

organ damage. Ayurveda, by design, targets function and resilience through personalised routines, nutrition, behavioural guidance, and selected pharmacologically active botanicals, providing a structured “whole-system” adjunct to standard care.<sup>13,15</sup> Ayurveda for filling the gaps in western medicine has been scientifically described and accepted.<sup>19</sup> Therefore, integration is best framed not as an alternative to modern medicine, but as an outcomes-driven extension of patient care: improving daily functioning, tolerability of conventional treatments, and long-term preservation of cardiovascular, metabolic, neuroendocrine, immune, and musculoskeletal health.

### **Mechanistic convergence - how Yoga and Ayurveda can complement biomedicine**

#### **Autonomic regulation, stress biology, and organ function preservation**

Autonomic imbalance—characterised by sympathetic overactivity and reduced vagal tone—is associated with hypertension, insulin resistance, inflammatory activation, arrhythmogenesis, endothelial dysfunction, and adverse cardiac outcomes. Heart rate variability (HRV), a marker of autonomic regulation, tends to improve with Yoga practice in many studies, suggesting enhanced parasympathetic activity and improved stress resilience.<sup>6</sup> These shifts are clinically relevant because chronic sympathetic activation contributes to cardiometabolic strain and impaired recovery from illness. Ayurveda’s emphasis on daily routines, sleep regularity, mindful eating, and stress-modulating practices aims to stabilise circadian and neuroendocrine rhythms, which may further support autonomic balance and metabolic homeostasis.<sup>13</sup> In integrated care, Yoga and Ayurvedic lifestyle measures can be positioned as “organ-protective co-therapies,” acting upstream on stress physiology rather than competing with disease-specific pharmaceuticals.

#### **Inflammation, immune signalling, and symptom burden**

Low-grade chronic inflammation is a shared pathway across atherosclerosis, diabetes, cancer-related fatigue, depression, rheumatoid arthritis, and other chronic disorders. A systematic review focusing on Yoga and inflammatory biomarkers reported that most included studies showed improvements in markers such as IL-6, CRP, and TNF- $\alpha$ , with signals suggesting a dose relationship (greater total practice time associated with greater improvement).<sup>7</sup> Reducing inflammatory tone plausibly supports organ function preservation by slowing endothelial injury, insulin resistance progression, and catabolic states that accelerate sarcopenia and frailty. In Ayurveda, many botanicals and formulations are proposed to modulate inflammatory pathways and oxidative stress, but heterogeneity of preparations and variable trial quality necessitate careful product selection and monitoring.<sup>15</sup> Integrative programmes can therefore combine a behavioural anti-inflammatory approach (Yoga, stress reduction, sleep optimisation) with selected evidence-supported Ayurvedic agents when appropriate, while maintaining biomedical monitoring for inflammatory disease activity and organ function.

#### **Cardiometabolic regulation: blood pressure and glucose control**

Hypertension and type 2 diabetes are major drivers of kidney disease, stroke, myocardial infarction, retinopathy, and neuropathy. A meta-analysis of Yoga for hypertension reported reductions in blood pressure across trials, supporting Yoga as a meaningful lifestyle-adjunct for cardiometabolic risk management.<sup>5</sup> An umbrella review of systematic reviews similarly concluded Yoga shows effects for blood pressure and blood glucose outcomes, alongside benefits for depression and fatigue.<sup>4</sup> For Ayurveda, a large systematic review and

meta-analysis of Ayurvedic medicines for type 2 diabetes reported improvements in glycaemic measures across a range of interventions, while highlighting limitations in reporting quality and inconsistent adverse event documentation.<sup>15</sup> In integrated care, the most defensible model is: keep guideline-directed pharmacotherapy as the backbone; add Yoga and structured lifestyle medicine to reduce risk factors; and consider carefully selected, quality-assured Ayurvedic interventions under clinical governance, with explicit monitoring plans for glucose, liver/kidney function where relevant, and interaction risk.<sup>14,15,17</sup> There is a question whether ancient medical practitioners were ahead of this time and offered a more holistic medicine.<sup>9</sup>

### **Clinical evidence- where benefits are most plausible and measurable**

#### **Quality of life, fatigue, sleep, and psychosocial outcomes**

QoL endpoints often determine whether patients perceive care as successful. Yoga has demonstrated benefits for symptoms that strongly influence QoL, including sleep and fatigue in cancer settings. A randomised trial of Tibetan Yoga in women with breast cancer undergoing chemotherapy found improvements in specific sleep disturbance outcomes compared with stretching/usual care at certain time points, illustrating potential value as supportive care during intensive treatment.<sup>20</sup> Across broader chronic disease contexts, umbrella-level evidence supports Yoga’s impact on depression and fatigue management, outcomes that frequently co-drive disability and healthcare utilisation.<sup>4,11</sup> Clinically, these gains can reduce the perceived “side-effect burden” of conventional treatments by improving coping capacity, sleep quality, pain thresholds, and emotional regulation, even when medication regimens remain unchanged.

#### **Reduction of side effects: direct and indirect pathways**

The phrase “side-effect reduction” should be approached scientifically. Yoga and Ayurvedic lifestyle interventions may not directly neutralise pharmacological adverse effects, but they can reduce symptom amplification and improve physiologic reserves, thereby lowering side-effect severity (e.g., improved sleep reducing fatigue perception, improved autonomic tone reducing palpitations/anxiety, and improved physical conditioning reducing musculoskeletal pain).<sup>4,6,20</sup> Additionally, if integrated interventions improve primary disease control (e.g., modest blood pressure or glucose improvements), clinicians may be able to de-escalate doses in selected patients, potentially reducing dose-dependent adverse effects—this is a hypothesis that must be tested and enacted only with standard clinical safeguards.<sup>5,15</sup> In supportive oncology, integrative approaches are often used precisely to improve tolerability and function during therapy, provided they do not interfere with pharmacokinetics or safety.<sup>20,21</sup>

#### **Organ function preservation: a pragmatic interpretation**

“Organ function preservation” in integrative care is best defined as slowing progression of end-organ damage and improving physiological resilience (rather than claiming organ regeneration). For cardiometabolic organs (heart, brain, kidneys), Yoga’s effects on blood pressure, autonomic regulation, and inflammation provide a plausible protective triad.<sup>3,7</sup> For metabolic organs (liver, pancreas), improved glycaemic control and reduced inflammatory signalling may slow progression of steatotic and diabetic complications, while Ayurveda may add targeted metabolic adjuncts if quality-assured and monitored.<sup>15</sup> For musculoskeletal systems, reduced inflammation and improved functional movement can preserve mobility and reduce frailty risk, an increasingly important outcome in ageing populations.<sup>4,7</sup> Yoga is a more natural way of mobilising joints body organ functions.

## **Ayurveda alongside modern medicine: evidence, limitations, and responsible use**

Ayurveda's integration requires explicit attention to variability of formulations, standardisation, and safety monitoring. Evidence exists for adjunctive use in some chronic inflammatory conditions; for example, a double-blind randomised pilot study compared classic Ayurvedic medicine, methotrexate, and combination therapy in rheumatoid arthritis, illustrating feasibility of comparative designs and combined-therapy evaluation.<sup>22</sup> However, the broader literature includes heterogeneous interventions and variable reporting, so the clinical standard should emphasise: (a) quality-assured sourcing, (b) conservative dosing, (c) clear outcome targets, and (d) robust adverse event and laboratory monitoring when needed.<sup>14,15</sup> Herb-drug interaction risk is a core integration issue; authoritative reviews and WHO technical guidance stress that some herbal products can meaningfully alter drug metabolism/transport (e.g., via CYP enzymes and P-glycoprotein), and clinicians should remain vigilant—particularly with narrow therapeutic index medicines and oncology drugs.<sup>14,17,18</sup> Integrative practice is therefore safest when it operates like pharmacotherapy: documented indication, product identity, dosing plan, monitoring, and stop-rules.

### **Practical integration model for clinics and health systems**

A clinically credible pathway integrates Yoga and Ayurveda into standard care through staged implementation.

- I. Risk-stratified referral:** Yoga therapy for most patients (with adaptations for frailty, pregnancy, pain, cardiac disease) and Ayurveda consultation for selected patients where lifestyle and dietary personalisation is needed or where evidence-supported botanicals are being considered.<sup>4-6,15</sup>
- II. Shared decision-making and consent:** Explicitly communicate expected benefits (QoL, stress regulation, functional improvement), uncertainty areas, and safety constraints.<sup>14,15,17,18</sup>
- III. Medication reconciliation + interaction screen:** Document all supplements and botanicals; screen for high-risk interactions; coordinate with pharmacy/primary team.<sup>14,17,18</sup>
- IV. Outcome measurement:** Track QoL (validated tools), sleep, fatigue, blood pressure, HbA1c/fasting glucose where relevant, pain/function scores, and selected biomarkers if clinically justified.<sup>4,7,15</sup>
- V. Audit and governance:** Standardise Yoga protocols; ensure instructor competence; use quality-assured Ayurvedic products; implement adverse event reporting and periodic review.

This approach preserves the strengths of modern medicine (diagnosis, risk stratification, disease-modifying therapy) while adding structured, evidence-informed tools that address function, resilience, and lived experience of illness. Integrating Yoga and Ayurveda with modern medicine is thus most scientifically defensible when framed as **adjunctive, outcomes-driven, and safety-governed** care. Evidence supports Yoga's benefits across multiple chronic disease domains—particularly for depression, fatigue, blood pressure, glycaemic markers, autonomic regulation, and inflammatory signalling—outcomes that translate into improved QoL and potentially slower progression of end-organ injury.<sup>4-7</sup> Ayurveda offers a personalised lifestyle and dietary framework and selected botanical interventions with emerging evidence in cardiometabolic and inflammatory conditions, but with variable trial quality and a strong need for standardisation and pharmacovigilance.<sup>15,22</sup> Safety is central: herb-drug interactions and

product variability demand WHO-aligned vigilance and conservative, monitored use.<sup>14,17,18</sup> When these principles are followed, integrative medicine can enhance patient-centred care—supporting better daily functioning, improved treatment tolerability, and a more sustainable long-term trajectory of health. This will improve the patient care<sup>8</sup> and improve patient choice which is often talked about but not well implemented.

## **Integrating Tai Chi and Qigong with modern medicine**

### **Rationale for integrating Tai Chi and Qigong in contemporary clinical care**

Tai Chi (Taijiquan) and Qigong are traditional Chinese mind-body practices characterised by slow, coordinated movements, postural alignment, breath regulation, and focused attention. Although historically rooted in Traditional Chinese Medicine, their therapeutic effects can be understood through modern neurophysiology, cardiovascular science, immunology, and behavioural medicine. Unlike high-intensity exercise, Tai Chi and Qigong are low-impact and adaptable across age groups and disease severities, making them particularly suitable for elderly patients, those with multimorbidity, frailty, chronic pain, and post-acute recovery states. Evidence increasingly supports their role as adjuncts to modern medicine in improving functional capacity, psychological wellbeing, and physiological resilience, all of which are central to long-term organ function preservation and patient-centred care.<sup>23-25</sup>

### **Mechanistic pathways- convergence with biomedical science**

#### **Autonomic balance, neuroplasticity, and stress modulation**

Chronic disease is frequently associated with dysregulation of the autonomic nervous system, characterised by sympathetic overdrive and impaired parasympathetic tone. Tai Chi and Qigong emphasise slow rhythmic movements synchronised with diaphragmatic breathing and mindful awareness, which have been shown to enhance vagal activity and improve heart rate variability.<sup>23-26</sup> Improved autonomic balance is clinically significant, as it is associated with reduced arrhythmogenic risk, improved blood pressure control, enhanced metabolic regulation, and better emotional regulation. Neuroimaging and psychophysiological studies suggest that these practices may also promote adaptive neuroplasticity within cortical and subcortical networks involved in attention, emotion, and interoception, supporting mental resilience and cognitive preservation.<sup>24</sup>

#### **Inflammation, immune regulation, and cellular ageing**

Low-grade systemic inflammation underpins many chronic conditions, including cardiovascular disease, diabetes, neurodegeneration, and cancer-related fatigue. Systematic reviews indicate that Tai Chi and Qigong practice is associated with reductions in inflammatory biomarkers such as C-reactive protein and pro-inflammatory cytokines, alongside improvements in immune cell profiles.<sup>25,27</sup> These anti-inflammatory effects may contribute to slower progression of endothelial dysfunction, reduced insulin resistance, and preservation of musculoskeletal integrity. Emerging data also suggest favourable effects on oxidative stress and telomerase activity, raising the hypothesis that regular practice may influence biological ageing pathways relevant to long-term organ health.<sup>28</sup>

### **Clinical benefits across major disease domains**

#### **Cardiovascular and metabolic health**

Cardiovascular disease remains a leading cause of morbidity despite advances in pharmacotherapy and interventional cardiology.

Meta-analyses demonstrate that Tai Chi can improve systolic and diastolic blood pressure, lipid profiles, exercise tolerance, and balance, making it a valuable adjunct in cardiac rehabilitation and secondary prevention programmes.<sup>23,29</sup> Qigong has shown benefits in glycaemic control and insulin sensitivity in patients with type 2 diabetes, supporting metabolic organ function preservation by reducing glucotoxicity and vascular complications.<sup>30</sup> Importantly, these benefits are achieved with minimal musculoskeletal strain, improving adherence in populations unable to tolerate conventional exercise.

### Neurological conditions and cognitive preservation

Tai Chi and Qigong have been studied in neurodegenerative and post-neurological injury contexts, including Parkinson's disease, stroke, and mild cognitive impairment. Evidence suggests improvements in balance, gait stability, executive function, and fear of falling, outcomes that directly influence independence and quality of life.<sup>31,32</sup> From an organ-preservation perspective, enhanced cerebral perfusion, reduced neuroinflammation, and improved motor control may slow functional decline and reduce secondary complications such as falls, fractures, and deconditioning.

### Musculoskeletal disorders, chronic pain, and frailty

Chronic musculoskeletal pain and osteoarthritis are major contributors to disability and polypharmacy. Tai Chi has demonstrated efficacy in reducing pain and improving physical function in knee osteoarthritis and fibromyalgia, with effect sizes comparable to some pharmacological and physiotherapy interventions.<sup>33</sup> These improvements may allow dose reduction of analgesics in selected patients, indirectly reducing drug-related adverse effects such as gastrointestinal, renal, and cardiovascular toxicity. By improving balance, muscle strength, and proprioception, Tai Chi and Qigong also play a role in frailty prevention and preservation of musculoskeletal organ systems in ageing populations.<sup>34</sup>

### Quality of life and reduction of treatment-related side-effects

Quality of life is increasingly recognised as a core outcome in chronic disease management. Tai Chi and Qigong consistently demonstrate improvements in patient-reported outcomes, including fatigue, sleep quality, mood, and perceived stress.<sup>24,27</sup> These benefits are particularly relevant in patients undergoing long-term pharmacotherapy or cancer treatments, where symptom burden often limits adherence and overall wellbeing. While these practices do not neutralise pharmacological side-effects directly, they can attenuate symptom perception, enhance coping mechanisms, and improve physiological reserves, thereby reducing the functional impact of adverse effects.<sup>28,35</sup> In integrated care pathways, this supportive role complements modern medicine's disease-modifying intent.

### Organ function preservation: a systems-based interpretation

From a biomedical perspective, organ function preservation refers to maintaining structural integrity, physiological function, and adaptive capacity over time. Tai Chi and Qigong contribute to this goal through multi-system effects: cardiovascular conditioning without overload, neuromuscular coordination with minimal injury risk, metabolic efficiency through improved insulin sensitivity, and immune modulation through stress reduction.<sup>23-25,42</sup> By acting upstream on lifestyle-related pathophysiology and downstream on functional outcomes, these practices help slow the trajectory from compensated chronic disease to irreversible organ damage. This systems-based benefit aligns well with preventive cardiology, geriatric medicine, neurorehabilitation, and palliative supportive care.

### Practical integration into modern healthcare systems

Effective integration of Tai Chi and Qigong into modern medicine requires structured implementation. Programmes should be evidence-informed, delivered by trained instructors familiar with clinical adaptations, and embedded within multidisciplinary care pathways. Outcome measures should include validated quality-of-life scales, balance and mobility tests, cardiometabolic markers, and patient-reported symptom scores.<sup>29,33</sup> Importantly, integration does not replace pharmacological or interventional therapies but enhances their tolerability and effectiveness by addressing functional and psychosocial dimensions of health. When adopted within clinical governance frameworks, Tai Chi and Qigong represent low-cost, low-risk interventions with a favourable benefit-risk profile.

The integration of Tai Chi and Qigong with modern medicine thus offers a scientifically plausible and increasingly evidence-supported approach to improving quality of life, reducing the functional burden of treatment side-effects, and supporting long-term organ function preservation. Through modulation of autonomic balance, inflammation, metabolic regulation, and neuromuscular coordination, these practices address core mechanisms underlying chronic disease progression.<sup>23-28</sup> When combined with guideline-based medical care, they contribute to holistic, patient-centred healthcare that values function, resilience, and lived experience alongside disease control.

### Integrating acupuncture, acupressure, and cupping therapy with modern medicine

#### Rationale for integrating acupuncture-based therapies into modern healthcare

Acupuncture, acupressure, and cupping therapy are core components of Traditional Chinese Medicine that have gained increasing scientific and clinical attention within modern healthcare systems. These therapies are now commonly used as adjuncts in pain clinics, oncology supportive care, musculoskeletal rehabilitation, neurology, and psychosomatic medicine. Their growing acceptance reflects an expanding evidence base demonstrating benefits in symptom control, functional improvement, and modulation of neuro-immune-endocrine pathways. Importantly, these interventions are non-pharmacological, minimally invasive (or non-invasive in the case of acupressure), and generally well tolerated, making them particularly valuable in patients experiencing medication intolerance, polypharmacy, or chronic disease-related symptom burden.<sup>36-39</sup>

#### Mechanistic foundations - bridging traditional concepts and modern science

##### Neurophysiological modulation and pain regulation

From a biomedical perspective, acupuncture and acupressure exert effects through stimulation of peripheral nerves, leading to central nervous system responses involving endogenous opioid release, modulation of serotonin and noradrenaline pathways, and altered pain perception within the spinal cord and brain. Functional neuroimaging studies have demonstrated changes in limbic and cortical pain-processing regions following acupuncture, supporting its role in central pain modulation.<sup>36,40,41</sup>

These mechanisms are highly relevant in chronic pain syndromes, where central sensitisation plays a major role and long-term pharmacological strategies often lead to adverse effects or dependency.

##### Autonomic balance, vascular regulation, and organ perfusion

Acupuncture has been shown to influence autonomic nervous system balance, with reductions in sympathetic tone and improvements

in parasympathetic activity. These effects may contribute to improved microcirculation, reduced vasoconstriction, and enhanced tissue oxygenation.<sup>42</sup> Cupping therapy, through negative pressure applied to the skin and superficial tissues, may further enhance local blood flow, promote lymphatic drainage, and reduce myofascial tension. Improved regional perfusion and reduced ischemic stress are relevant to organ function preservation, particularly in musculoskeletal tissues and in conditions associated with chronic vascular compromise.<sup>43</sup>

### **Clinical benefits across major domains of modern medicine**

#### **Pain management and musculoskeletal health**

Chronic pain remains one of the most common reasons for healthcare utilisation and long-term medication use. Systematic reviews and meta-analyses have demonstrated that acupuncture is superior to sham and usual care for chronic low back pain, osteoarthritis, neck pain, and tension-type headaches.<sup>36,44</sup> Acupressure has shown similar, though generally more modest, benefits for pain and symptom relief, with the advantage of being self-administered and cost-effective.<sup>45</sup> By reducing pain intensity and improving function, these therapies may allow dose reduction of analgesics, thereby decreasing risks of gastrointestinal, renal, and cardiovascular adverse effects associated with long-term NSAID or opioid use. This indirect reduction in drug toxicity contributes meaningfully to organ function preservation over time.

#### **Oncology supportive care and treatment tolerability**

In oncology, acupuncture and acupressure are increasingly incorporated into supportive care pathways. Evidence supports their use in reducing chemotherapy-induced nausea and vomiting, cancer-related pain, fatigue, xerostomia, and peripheral neuropathy.<sup>37,46</sup> These benefits directly improve quality of life and may enhance adherence to life-saving oncological treatments by reducing treatment-limiting side effects. Importantly, when practised by trained professionals within clinical governance frameworks, these therapies do not interfere with pharmacokinetics of chemotherapeutic agents and are considered safe adjuncts.<sup>28</sup>

#### **Neurological and psychosomatic conditions**

Acupuncture has demonstrated benefits in migraine prophylaxis, post-stroke rehabilitation, and certain anxiety- and stress-related disorders.<sup>41,47</sup> By modulating neuroplasticity, cerebral blood flow, and neurochemical signalling, acupuncture may support functional recovery and cognitive preservation following neurological injury. Acupressure has also shown promise in reducing anxiety, improving sleep quality, and alleviating autonomic symptoms, outcomes that strongly influence overall wellbeing and patient-reported quality of life.<sup>45</sup>

#### **Reduction of treatment-related side effects: clinical implications**

The concept of side-effect reduction through integrative therapies should be interpreted in a functional and systems-based manner. Acupuncture, acupressure, and cupping do not chemically neutralise drug toxicity; rather, they reduce symptom burden, enhance physiological resilience, and improve patient coping capacity.<sup>37,46</sup> For example, alleviation of nausea, pain, insomnia, and anxiety can significantly reduce the perceived and functional impact of pharmacological adverse effects. Over time, improved symptom control may allow clinicians to rationalise medication regimens, reducing cumulative drug exposure and associated organ stress. This synergistic model aligns with personalised, patient-centred medicine rather than replacement of evidence-based pharmacotherapy.

### **Organ Function Preservation: a multi-system perspective**

Organ Function Preservation in chronic disease depends on maintaining adequate perfusion, reducing inflammation, preventing neuroendocrine dysregulation, and minimising iatrogenic harm. Acupuncture-based therapies contribute to these goals by improving autonomic balance, reducing chronic pain-related stress responses, and enhancing functional mobility.<sup>42-44</sup>

In musculoskeletal systems, reduced inflammation and improved biomechanics help preserve joint and connective tissue integrity. In neurological and cardiovascular contexts, improved autonomic regulation and microcirculatory effects may slow functional decline. When integrated with modern diagnostics, pharmacology, and monitoring, these therapies support a long-term strategy aimed at sustaining organ function rather than merely suppressing symptoms.

#### **Safe and effective integration into modern clinical practice**

For responsible integration, acupuncture, acupressure, and cupping therapy should be delivered by appropriately trained practitioners within regulated settings. Clear communication between conventional clinicians and integrative practitioners is essential to ensure safety, particularly in patients with bleeding disorders, immunosuppression, or complex comorbidities. Outcome measures should include pain scores, quality-of-life indices, functional assessments, and condition-specific clinical markers.<sup>36,44</sup> When embedded within multidisciplinary care pathways, these therapies enhance holistic patient care without compromising biomedical standards.

The integration of acupuncture, acupressure, and cupping therapy with modern medicine hereby represents a scientifically plausible and increasingly evidence-supported approach to comprehensive patient care. Through neurophysiological modulation, autonomic regulation, and functional symptom relief, these therapies improve quality of life, reduce the functional burden of treatment-related side effects, and contribute to long-term organ function preservation.<sup>36-38,48</sup>

When applied judiciously alongside guideline-based medical treatment, they strengthen a holistic, patient-centred model of healthcare that values symptom relief, functional capacity, and sustainable health outcomes (Table 1).

### **Integrating chiropractic and osteopathy with modern medicine**

#### **Rationale for integrating chiropractic and osteopathic care into modern healthcare**

Chiropractic and osteopathy are regulated manual therapy disciplines widely practised across Europe, North America, and Australasia, with increasing collaboration with mainstream healthcare services. Both systems emphasise the interrelationship between structure and function, particularly of the musculoskeletal, nervous, and circulatory systems. In modern clinical contexts, chiropractic and osteopathic interventions are primarily used as adjuncts in the management of musculoskeletal pain, functional disorders, rehabilitation, and chronic disease-related disability. Their non-pharmacological nature makes them particularly valuable in an era of polypharmacy, ageing populations, and rising concerns about medication-related adverse effects.<sup>36-38</sup>

#### **Mechanistic foundations- structure-function integration in biomedical terms**

##### **Neuro-musculoskeletal modulation and pain pathways**

From a biomedical perspective, spinal manipulation and mobilization used in chiropractic and osteopathy influence pain through

mechanical, neurophysiological, and psychosocial mechanisms. These include modulation of peripheral nociceptive input, changes in spinal cord excitability, activation of descending inhibitory pathways, and alterations in muscle tone and joint biomechanics. Neurophysiological

studies suggest that manual therapies can influence central pain processing, reducing central sensitisation commonly seen in chronic pain conditions.<sup>49,52</sup> These effects are clinically significant in reducing reliance on long-term analgesic and anti-inflammatory medications.

**Table 1** Summary of integrative medicine modalities: mechanisms, clinical indications, and outcomes

Modality	Key biological & psychophysiological mechanisms	Major clinical indications (adjunctive use)	Demonstrated & plausible clinical outcomes
<b>Yoga</b>	Autonomic regulation (↑ parasympathetic tone), ↓ cortisol, ↓ inflammation, improved mitochondrial efficiency, neuroplasticity	Hypertension, CAD, heart failure, diabetes, anxiety, depression, chronic pain, cancer survivorship	↑ Quality of life (QoL), ↓ BP & glucose, ↓ fatigue & pain, ↓ medication burden, improved organ resilience
<b>Ayurveda</b>	Personalised lifestyle & diet, anti-inflammatory & antioxidant phytochemicals, metabolic regulation, circadian alignment	Metabolic syndrome, arthritis, GI disorders, chronic fatigue, inflammatory conditions	Improved symptom control, ↓ inflammatory load, metabolic optimisation, long-term Organ function preservation
<b>Tai Chi</b>	Balance & proprioception, autonomic modulation, improved microcirculation, anti-inflammatory effects	Falls prevention, Parkinson's disease, stroke rehab, cardiovascular disease, frailty	↓ Falls, ↑ mobility & balance, ↓ BP, improved QoL, musculoskeletal preservation
<b>Qigong</b>	Breath–movement synchrony, immune modulation, stress reduction, improved insulin sensitivity	Type 2 diabetes, cancer fatigue, chronic pain, anxiety disorders	↓ Fatigue, improved metabolic control, enhanced immune resilience
<b>Acupuncture</b>	Endogenous opioid release, CNS pain modulation, autonomic balance, microcirculatory improvement	Chronic pain, migraine, osteoarthritis, nausea, oncology supportive care	↓ Pain & nausea, ↓ analgesic use, ↑ function, better treatment tolerance
<b>Acupressure</b>	Peripheral nerve stimulation, autonomic calming, self-regulation	Pain, anxiety, nausea, insomnia	Symptom relief, improved self-management, ↓ side-effect burden
<b>Cupping Therapy</b>	Local hyperaemia, myofascial release, lymphatic drainage	Myofascial pain, musculoskeletal stiffness	↓ Pain & stiffness, improved mobility
<b>Chiropractic</b>	Spinal & neuromuscular modulation, ↓ central sensitisation, biomechanical optimisation	Low back pain, neck pain, headaches, musculoskeletal dysfunction	↓ Pain, ↑ function, ↓ NSAID/opioid use
<b>Osteopathy</b>	Structure–function integration, fascial continuity, autonomic & respiratory optimisation	Musculoskeletal pain, respiratory dysfunction, paediatric functional disorders	Improved mobility, respiratory efficiency, functional resilience
<b>Homeopathy</b>	Individualised regulatory effects (systems-level), psychosomatic modulation	Allergic disorders, recurrent infections, IBS, dermatological conditions	Improved QoL, ↓ symptom recurrence, high patient satisfaction
<b>Naturopathy</b>	Lifestyle medicine, nutrition optimisation, metabolic & inflammatory control	Metabolic syndrome, diabetes, cardiovascular risk, chronic fatigue	↓ Disease progression, ↓ side effects, Organ function preservation
<b>Hypnotherapy</b>	CNS pain modulation, altered perception, autonomic & immune regulation	IBS, chronic pain, oncology, procedural anxiety	↓ Pain & symptom severity, ↓ medication needs
<b>Mind–Body Medicine</b>	Stress biology regulation, ↓ HPA overactivity, ↑ neuroplasticity	Hypertension, CAD, depression, anxiety, burnout	↓ BP & stress, improved emotional regulation, organ protection

**Autonomic nervous system regulation and visceral function**

Emerging evidence indicates that spinal and soft-tissue manipulation may influence autonomic nervous system balance, with measurable effects on heart rate variability, blood pressure, and stress responses.<sup>53</sup> Improved autonomic regulation has downstream implications for cardiovascular, gastrointestinal, and respiratory function, supporting a broader concept of organ function preservation through reduced neuroendocrine stress and improved physiological adaptability. Osteopathic approaches, in particular, emphasise diaphragmatic mechanics, rib mobility, and fascial continuity, which may influence respiratory efficiency and venous/lymphatic return.<sup>50,54</sup>

**Clinical benefits across key domains of patient care**

**Musculoskeletal disorders and functional restoration**

Low back pain, neck pain, and related musculoskeletal disorders are leading causes of disability worldwide. High-quality evidence supports spinal manipulation as an effective option for acute and chronic low back pain, with outcomes comparable to conventional medical care and physiotherapy.<sup>49,45</sup> Osteopathic manipulative treatment has similarly demonstrated benefits in pain reduction and functional improvement. By restoring mobility, improving posture, and reducing pain, these therapies enhance daily functioning and

quality of life while potentially reducing the need for long-term NSAIDs, opioids, and muscle relaxants—thereby lowering risks of gastrointestinal, renal, and cardiovascular adverse effects.<sup>51,56</sup>

### **Chronic disease, rehabilitation, and ageing populations**

In patients with chronic conditions such as osteoarthritis, fibromyalgia, and post-stroke musculoskeletal dysfunction, chiropractic and osteopathy contribute to improved mobility, balance, and confidence in movement.<sup>54,57</sup> These benefits are particularly relevant in older adults, where maintaining musculoskeletal integrity is critical for preventing falls, preserving independence, and avoiding secondary complications such as fractures, deconditioning, and hospitalisation. From an organ-preservation perspective, maintaining mobility and physical activity supports cardiovascular, metabolic, and neurological health over the long term.

### **Respiratory, gastrointestinal, and paediatric considerations**

Osteopathic care has been explored as an adjunct in respiratory conditions such as asthma and chronic obstructive pulmonary disease, focusing on chest wall mechanics, diaphragmatic function, and breathing efficiency.<sup>58</sup> While not a substitute for pharmacological therapy, such interventions may improve symptom control and exercise tolerance. In paediatrics, gentle osteopathic approaches have been studied in conditions such as infant colic, feeding difficulties, and musculoskeletal asymmetries, with some evidence of symptomatic benefit and high parental satisfaction.<sup>59</sup> These applications highlight the potential of manual therapies to support functional wellbeing alongside standard medical care.

### **Reduction of treatment-related side effects and medication burden**

A major advantage of integrating chiropractic and osteopathy into modern medicine lies in their capacity to reduce reliance on pharmacotherapy for symptom control. By effectively managing pain, stiffness, and functional limitation, these therapies can decrease cumulative exposure to analgesics and anti-inflammatory drugs.<sup>55,56</sup> This indirect reduction in medication burden is particularly important in patients with renal disease, gastrointestinal vulnerability, cardiovascular risk, or frailty. Additionally, improved physical function and reduced pain contribute to better sleep, mood, and overall resilience, further mitigating the perceived and functional impact of treatment-related side effects.

### **Organ Function Preservation through functional optimisation**

Organ function preservation is increasingly recognised as dependent not only on disease-specific treatments but also on maintaining global physiological function. Chiropractic and osteopathic care support this goal by optimising musculoskeletal alignment, enhancing neuromuscular coordination, and reducing chronic stress responses.<sup>52-54</sup> Improved posture and spinal mobility can positively influence respiratory mechanics and cardiovascular efficiency, while reduced pain-related inactivity helps preserve metabolic and musculoskeletal organ systems. When integrated with modern diagnostics and pharmacology, these therapies contribute to a long-term strategy aimed at sustaining organ function and preventing secondary complications.

### **Governance, safety, and integration into healthcare systems**

For effective integration, chiropractic and osteopathy must operate within evidence-based, regulated frameworks. Practitioners should be appropriately trained, registered, and engaged in multidisciplinary communication with medical teams. Clear referral pathways, shared documentation, and outcome monitoring are essential to ensure patient

safety and optimise benefits.<sup>36,38</sup> When applied judiciously, serious adverse events are rare, and the benefit–risk profile is favourable, particularly when compared with long-term pharmacological strategies for chronic pain.<sup>55</sup> The integration of chiropractic and osteopathy with modern medicine offers a scientifically plausible and clinically valuable approach to comprehensive patient care. Through neuro-musculoskeletal modulation, autonomic regulation, and functional restoration, these therapies improve quality of life, reduce the functional burden of treatment-related side effects, and support long-term Organ function preservation.<sup>49-59</sup> When embedded within multidisciplinary, evidence-informed care pathways, chiropractic and osteopathic interventions strengthen a holistic, patient-centred model of healthcare that complements biomedical excellence with functional and preventative strategies.

### **Integrating homeopathy and naturopathy with modern medicine**

#### **Rationale for integrating homeopathy and naturopathy into contemporary healthcare**

Homeopathy and naturopathy represent two widely practised systems of complementary medicine that are increasingly accessed by patients alongside conventional medical care, particularly in chronic, functional, and lifestyle-related disorders. Homeopathy is based on the principle of individualised treatment using ultra-diluted substances selected according to a patient's symptom profile, constitution, and response patterns, while naturopathy emphasises lifestyle optimisation, nutrition, exercise, stress management, hydrotherapy, and selected natural agents to support self-healing mechanisms. Their integration with modern medicine reflects patient demand for holistic, person-centred care that addresses not only disease pathology but also wellbeing, resilience, and long-term functional health.<sup>60-62</sup>

#### **Conceptual and mechanistic considerations in a biomedical context**

##### **Homeopathy- clinical outcomes and systems-level interpretations**

The mechanisms of action of homeopathic medicines remain controversial within conventional biomedical frameworks due to the ultra-molecular dilutions used. However, contemporary hypotheses explore non-material informational, nano-structural, or regulatory signalling effects, while clinical research has focused primarily on patient-centred outcomes rather than molecular pharmacology.<sup>60,63</sup> From an integrative medicine perspective, homeopathy is best evaluated by its potential role in symptom modulation, improved quality of life, reduced disease burden, and enhanced adaptive responses, particularly in chronic conditions where conventional medicine offers symptomatic control but limited curative potential.<sup>61</sup>

##### **Naturopathy- lifestyle medicine and physiological optimisation**

Naturopathy aligns more directly with modern biomedical science through its emphasis on diet, physical activity, sleep, stress reduction, gut health, and environmental factors. These elements correspond closely with recognised determinants of chronic disease progression and organ damage, including inflammation, insulin resistance, oxidative stress, and neuroendocrine dysregulation.<sup>62,64</sup> By targeting upstream lifestyle drivers of disease, naturopathic interventions complement pharmacological therapies that act downstream on disease manifestations.

#### **Clinical evidence and areas of benefit**

##### **Quality of life and patient-reported outcomes**

Multiple observational studies, pragmatic trials, and systematic reviews suggest that homeopathic care is associated with

improvements in quality of life, wellbeing, and symptom severity across a range of chronic conditions, including allergic disorders, dermatological diseases, irritable bowel syndrome, and recurrent respiratory infections.<sup>61,65</sup> While effect sizes vary and methodological limitations exist, these outcomes are clinically meaningful in patient-centred care, particularly when integrated alongside evidence-based medical treatment rather than used as a replacement.

Naturopathic approaches have demonstrated improvements in quality of life and functional outcomes in conditions such as cardiovascular risk syndromes, metabolic disorders, chronic fatigue, and stress-related illness.<sup>64,66</sup> These benefits are mediated through sustained lifestyle changes, improved self-efficacy, and enhanced patient engagement with health behaviours.

### Reduction of treatment-related side effects

One of the most consistent reasons patients seek homeopathy and naturopathy is to mitigate adverse effects of long-term pharmacotherapy. Homeopathic remedies are generally regarded as safe when appropriately prescribed and may reduce symptom burden such as fatigue, gastrointestinal upset, sleep disturbance, or mood symptoms associated with chronic illness or medication use.<sup>63,65</sup> Although not a substitute for pharmacological management, symptom relief may improve adherence to essential conventional treatments.

Naturopathy contributes to side-effect reduction by addressing nutritional deficiencies, supporting gut microbiota balance, improving hepatic and renal resilience through hydration and dietary optimisation, and reducing inflammatory load.<sup>62,64</sup> For example, dietary and lifestyle interventions can reduce statin-associated myalgia, antihypertensive-related fatigue, and glycaemic variability associated with antidiabetic therapy, thereby improving tolerability without compromising disease control.

### Organ function preservation through integrative, preventive strategies

Organ function preservation in chronic disease is closely linked to long-term control of inflammation, metabolic stress, oxidative damage, and behavioural risk factors. Naturopathic medicine directly addresses these pathways through evidence-aligned lifestyle medicine, nutritional therapy, weight management, and stress reduction, all of which are associated with reduced progression of cardiovascular, metabolic, hepatic, and renal disease.<sup>64,66</sup> Homeopathy may contribute indirectly to organ function preservation by reducing recurrent inflammatory episodes (e.g. infections, allergic flares), improving psychosomatic balance, and enhancing overall resilience, thereby decreasing cumulative physiological stress on organ systems.<sup>61,65</sup> In integrated care models, these effects are viewed as complementary to disease-modifying pharmacotherapy rather than competing with it.

### Safety, governance, and ethical integration

Responsible integration of homeopathy and naturopathy requires clear ethical and clinical governance. Homeopathy should be practised by trained professionals, with transparent communication regarding evidence limitations and strict avoidance of replacing essential medical treatment, particularly in life-threatening conditions.<sup>60,63</sup> Naturopathic interventions must be evidence-informed, avoid unsupported claims, and ensure safety with respect to herb–drug and supplement–drug interactions. Collaborative care models, shared decision-making, and outcome monitoring are essential to ensure that integrative approaches enhance, rather than undermine, modern medical care. When practised within these boundaries, both systems demonstrate favourable safety profiles and high patient satisfaction.<sup>62,66</sup> It's good to see that the

integration of homeopathy and naturopathy with modern medicine offers a patient-centred, preventive, and supportive dimension to healthcare that is increasingly relevant in the management of chronic disease. While homeopathy remains scientifically debated, evidence suggests potential benefits in quality of life and symptom burden when used adjunctively and responsibly. Naturopathy, grounded in lifestyle and behavioural medicine, aligns closely with contemporary understanding of chronic disease prevention and Organ function preservation. Together, when integrated with evidence-based medical practice, these approaches can reduce the functional impact of treatment side effects, support long-term organ health, and enhance overall patient care.

### Integrating hypnotherapy and mind–body medicine with modern medicine

#### Rationale for integrating hypnotherapy and mind–body medicine in modern clinical care

Once organic medical cause has been excluded, non-pharmacologic approach to pain is recommended. Hypnotherapy and mind–body medicine represent a scientifically evolving domain that directly addresses the bidirectional communication between psychological processes and physiological function. Hypnotherapy involves the therapeutic use of focused attention, guided imagery, and suggestion to influence perception, cognition, emotion, and somatic responses, while mind–body medicine encompasses structured interventions such as meditation, relaxation response training, mindfulness-based stress reduction (MBSR), guided imagery, biofeedback, and cognitive–emotional self-regulation techniques. These approaches are increasingly integrated into mainstream healthcare for pain management, oncology, gastroenterology, cardiology, mental health, and perioperative care. Their non-invasive nature, safety profile, and ability to modulate central regulatory systems make them particularly valuable adjuncts in chronic disease management and supportive care.<sup>67–69</sup>

#### Mechanistic foundations- psychoneuroimmunology and systems biology

##### Central nervous system regulation and neuroplasticity

Mind–body interventions exert their primary effects through central nervous system modulation, influencing cortical–limbic networks involved in attention, emotion, pain perception, and autonomic regulation. Functional neuroimaging studies demonstrate that hypnosis and meditation can alter activity in the anterior cingulate cortex, prefrontal cortex, and insula, and amygdala—regions integral to pain modulation, stress appraisal, and emotional regulation.<sup>67,70</sup> These neuroplastic changes underpin sustained improvements in symptom perception, coping capacity, and behavioural adaptation, which are essential for long-term disease management.

##### Autonomic, endocrine, and immune modulation

Chronic stress is a recognised driver of autonomic imbalance, hypothalamic–pituitary–adrenal (HPA) axis dysregulation, systemic inflammation, and accelerated organ damage. Mind–body medicine has been shown to reduce sympathetic overactivity, lower cortisol levels, and enhance parasympathetic tone, leading to improvements in heart rate variability, blood pressure regulation, and metabolic control.<sup>68,71</sup> Hypnotherapy has additionally demonstrated effects on immune parameters and inflammatory markers, suggesting a role in modulating psychoneuroimmunological pathways relevant to chronic inflammatory and autoimmune conditions.<sup>72</sup>

## Clinical benefits of hypnotherapy across major disease domains

### Pain management and functional disorders

Hypnotherapy is one of the most evidence-supported mind–body interventions for chronic pain, irritable bowel syndrome (IBS), fibromyalgia, and functional gastrointestinal disorders. Randomised controlled trials and meta-analyses demonstrate significant reductions in pain intensity, symptom severity, and healthcare utilisation in patients receiving gut-directed hypnotherapy for IBS.<sup>73,74</sup> These benefits are mediated by altered visceral pain processing, reduced central sensitisation, and improved autonomic regulation. Importantly, effective symptom control through hypnotherapy can reduce reliance on analgesics, antispasmodics, and sedatives, thereby lowering the risk of medication-related adverse effects.

### Oncology and treatment-related symptom burden

In oncology, hypnotherapy and mind–body techniques are increasingly incorporated into supportive care to manage pain, anxiety, fatigue, nausea, hot flushes, and procedural distress. Clinical studies demonstrate that hypnosis can reduce perioperative pain, analgesic requirements, and postoperative complications, while guided imagery and relaxation techniques improve chemotherapy tolerance and quality of life.<sup>69,75</sup> By attenuating stress-related neuroendocrine and immune suppression, these interventions may also support physiological resilience during intensive cancer treatments, contributing indirectly to organ function preservation.

### Cardiovascular, metabolic, and psychosomatic conditions

Mind–body medicine has demonstrated benefits in hypertension, coronary artery disease, metabolic syndrome, and stress-related disorders. The relaxation response and mindfulness-based interventions are associated with modest but clinically meaningful reductions in blood pressure, improved glycaemic control, and enhanced emotional regulation.<sup>68,71</sup> These effects are relevant to long-term preservation of cardiovascular, renal, and cerebrovascular organ systems by reducing cumulative allostatic load and behavioural risk factors.

### Reduction of treatment-related side effects and polypharmacy

A key contribution of hypnotherapy and mind–body medicine lies in their ability to reduce the perceived and functional burden of treatment-related side effects. By improving pain tolerance, sleep quality, anxiety control, and emotional resilience, these interventions can significantly

mitigate symptoms commonly attributed to pharmacotherapy, such as fatigue, nausea, insomnia, and cognitive fog.<sup>69,75</sup> Over time, improved symptom control may allow rationalisation of medication regimens in selected patients, reducing cumulative drug exposure and associated organ toxicity. This effect is particularly valuable in elderly patients and those with multimorbidity.

### Organ Function Preservation through stress reduction and behavioural optimisation

Organ Function Preservation is increasingly understood as a function of long-term neuroendocrine stability, immune balance, and health-supporting behaviours. Chronic psychological stress accelerates cardiovascular disease, metabolic dysfunction, neurodegeneration, and immune dysregulation. Hypnotherapy and mind–body medicine counteract these processes by reducing stress-related hormonal and inflammatory cascades, improving sleep and autonomic balance, and promoting adaptive coping strategies.<sup>70–72</sup> Through these mechanisms, mind–body interventions contribute to preserving organ function and delaying progression from functional impairment to irreversible structural disease.

### Integration into multidisciplinary, patient-centred care

Effective integration of hypnotherapy and mind–body medicine requires appropriately trained practitioners, clear clinical indications, and collaborative communication with medical teams. These interventions are best positioned as adjuncts within multidisciplinary care pathways, with outcome measures including quality-of-life indices, symptom scales, stress biomarkers, and disease-specific clinical parameters.<sup>67–69</sup> When embedded within evidence-based medicine, hypnotherapy and mind–body practices enhance holistic patient care without compromising biomedical rigor.

It's interesting to see that the integration of non-physical interventions like hypnotherapy and mind–body medicine with modern medical care represents a scientifically grounded and clinically valuable strategy for improving quality of life, reducing the functional impact of treatment-related side effects, and supporting long-term Organ function preservation. Through modulation of central nervous system processing, autonomic balance, and psychoneuroimmunological pathways, these approaches address core mechanisms underlying chronic disease progression and symptom burden.<sup>67–75</sup> When used responsibly alongside guideline-based medical treatments, hypnotherapy and mind–body medicine strengthen a truly integrative, patient-centred model of healthcare (Table 2).

**Table 2** Shared mechanistic pathways across integrative modalities

Core mechanism	Modalities involved	Clinical relevance
Autonomic nervous system balance	Yoga, Tai Chi, Qigong, Acupuncture, Osteopathy, Hypnotherapy	↓ Cardiovascular risk, ↓ arrhythmias, improved GI & immune function
Reduction of chronic inflammation	Yoga, Ayurveda, Tai Chi, Qigong, Naturopathy, Mind–Body Medicine	Slower disease progression, Organ function preservation
Central pain modulation	Acupuncture, Chiropractic, Osteopathy, Hypnotherapy	↓ Analgesic dependence, ↓ central sensitisation
Lifestyle & behavioural optimisation	Ayurveda, Naturopathy, Yoga, Mind–Body Medicine	↓ Metabolic disease burden, ↓ polypharmacy
Neuroplasticity & emotional regulation	Yoga, Tai Chi, Hypnotherapy, Mind–Body Medicine	↓ Anxiety/depression, ↑ coping & adherence

## Integrated medicine as a unified clinical framework - from fragmented modalities to whole-system patient care

### Toward a unified model of integrated medicine

The preceding sections have systematically examined the scientific rationale and clinical evidence supporting the integration of multiple

complementary and alternative medicine (CAM) disciplines—including Yoga, Ayurveda, Tai Chi, Qigong, acupuncture-based therapies, chiropractic, osteopathy, homeopathy, naturopathy, hypnotherapy, and mind–body medicine—alongside modern biomedicine. When viewed collectively, these modalities do not represent isolated or competing systems, but rather complementary

tools that converge on shared biological, psychological, and social mechanisms underpinning health and disease. Integrated medicine can therefore be defined as a **whole-system, evidence-informed approach** that combines the diagnostic precision and disease-modifying power of modern medicine with function-restoring, resilience-enhancing, and person-centred interventions drawn from validated complementary practices.<sup>76</sup>

### Common mechanistic threads across integrative modalities

Despite their diverse historical origins, the modalities reviewed in this article converge on several core mechanistic domains that are central to chronic disease progression and organ damage.

- I. Autonomic nervous system regulation** – Yoga, Tai Chi, Qigong, acupuncture, manual therapies, and mind–body interventions consistently demonstrate improvements in parasympathetic tone and stress resilience, with downstream benefits for cardiovascular, metabolic, gastrointestinal, and immune function.<sup>4–7,23–28,42,53 68</sup>
- II. Inflammation and immune modulation** – Multiple integrative therapies reduce low-grade chronic inflammation and modulate immune responses, a key driver of atherosclerosis, insulin resistance, neurodegeneration, and autoimmune disease.<sup>7,25,27,72</sup>
- III. Central pain and symptom processing** – Acupuncture, chiropractic, osteopathy, hypnotherapy, and mind–body medicine act on central sensitisation and pain perception, improving functional outcomes while reducing reliance on pharmacotherapy.<sup>36,41,49,52,67,73</sup>
- IV. Lifestyle and behavioural optimisation** – Ayurveda, naturopathy, Yoga, and mind–body medicine address diet, sleep, physical activity, stress, and self-regulation—determinants that account for a substantial proportion of chronic disease burden and healthcare costs.<sup>13,62,64,66</sup>

These shared pathways provide a coherent scientific foundation for integration and explain why multimodal, personalised approaches often outperform single-modality interventions in complex chronic conditions (Table 3).

**Table 3** Contribution of integrated medicine to key healthcare goals

Healthcare goal	How integrative medicine contributes
Quality of Life	Improves pain, fatigue, sleep, mood, mobility, and self-efficacy
Side-Effect Reduction	↓ Symptom amplification, ↓ medication doses, ↑ treatment tolerance
Organ Function Preservation	↓ Stress biology, ↓ inflammation, ↑ functional reserve
Chronic Disease Management	Addresses upstream lifestyle & psychosocial drivers
Healthcare Sustainability	↓ Hospitalisation, ↓ long-term medication costs, ↑ self-management

**Quality of life as a central clinical outcome** - A defining strength of integrated medicine is its prioritisation of **quality of life (QoL)** as a core outcome, alongside traditional biomedical markers. Improvements in pain, fatigue, sleep, mood, mobility, and self-efficacy consistently emerge across integrative interventions, even when disease-specific biomarkers show modest change.<sup>4, 20,24,37,61,69</sup> From a clinical perspective, QoL improvements are not secondary or “soft”

outcomes; they directly influence treatment adherence, functional independence, healthcare utilisation, and patient satisfaction. By addressing the lived experience of illness, integrated medicine aligns clinical success with patient values and real-world outcomes.

### Reduction of side effects and medication burden

Polypharmacy and treatment-related adverse effects represent major challenges in modern healthcare, particularly in ageing populations with multimorbidity. Integrated medicine offers a pragmatic strategy for **side-effect reduction**, not by opposing pharmacotherapy, but by reducing symptom amplification, enhancing physiological reserves, and improving coping capacity.<sup>37,46,69</sup> As symptom control improves, clinicians may safely rationalise medication regimens in selected patients, reducing cumulative drug exposure and associated organ toxicity. This approach is especially relevant for analgesics, sedatives, antidepressants, and anti-inflammatory drugs, where long-term use is associated with significant morbidity.

### Organ Function Preservation as a long-term systems goal

Organ Function Preservation emerges as a unifying objective of integrated medicine. Rather than focusing solely on end-stage disease markers, integrative approaches aim to slow functional decline by acting upstream on stress biology, inflammation, metabolic dysregulation, and physical deconditioning.<sup>5–7,25,30,43,51,54</sup> By maintaining mobility, autonomic balance, immune competence, and psychosocial stability, integrated care helps preserve cardiovascular, neurological, musculoskeletal, renal, and metabolic organ systems over time. This preventive and preservative orientation is particularly important in chronic disease trajectories where complete cure is unlikely, but functional longevity is achievable.

### Clinical governance, ethics, and evidence standards

For integrated medicine to be credible and scalable, robust governance is essential. This includes practitioner regulation, evidence-informed practice, transparent communication about benefits and limitations, and strict avoidance of replacing essential medical treatments.<sup>8,60,63</sup> Integrated medicine must remain aligned with the principles of patient safety, informed consent, and continuous outcome evaluation. Importantly, integration should be **bidirectional**: modern medicine informs safe and appropriate use of complementary therapies, while integrative approaches enrich biomedical care by addressing dimensions often neglected in conventional models (Table 4).

**Table 4** Integrated medicine vs conventional medicine – complementary roles

Domain	Modern medicine	Integrated medicine
Diagnosis	High precision diagnostics	Functional & constitutional assessment
Acute care	Life-saving interventions	Supportive & recovery optimisation
Chronic disease	Disease control	Symptom control, resilience, prevention
Medication	Targeted pharmacology	Dose-sparing & side-effect mitigation
Outcomes focus	Biomarkers & survival	QoL, function, long-term organ health

### Implications for healthcare systems and policy

Integrated medicine has significant implications for healthcare sustainability. By reducing symptom burden, improving self-

management, and preventing secondary complications, integrative approaches have the potential to lower healthcare utilisation, reduce long-term costs, and improve workforce productivity. (75-76) Health systems that incorporate evidence-based integrative services—such as structured Yoga therapy, acupuncture, mind–body programmes, and lifestyle medicine—may better address the growing burden of chronic disease, mental health disorders, and health inequalities. Policymakers and educators therefore have a critical role in supporting interdisciplinary training, research, and service models that enable safe and effective integration. This comprehensive review demonstrates that the integration of complementary and alternative medicine

disciplines with modern medicine is not only philosophically appealing but scientifically and clinically justified when practised responsibly. Across diverse modalities, consistent benefits are observed in quality of life, symptom control, reduction of treatment-related side effects, and preservation of organ function. Integrated medicine represents an evolution of healthcare—from a fragmented, disease-centred model to a **whole-person, systems-based, and prevention-oriented framework**. When guided by evidence, ethics, and collaboration, integrated medicine offers a powerful pathway toward more humane, effective, and sustainable patient care in the 21st century (Table 5).<sup>76–78</sup>

**Table 5** Integrated care pathways for chronic diseases - modern medicine with evidence-informed integrative adjuncts

Disease / condition	Tiered integrative interventions (adjunct to modern medicine)	Monitoring & outcomes	Stop rules / safety triggers
<b>Hypertension &amp; cardiovascular risk</b>	<b>Tier 1:</b> Yoga (asana + pranayama + relaxation), Tai Chi/Qigong, mind–body stress reduction <b>Tier 2:</b> Acupuncture for stress-linked BP elevation, sleep disturbance	BP (home & clinic), HRV (if available), lipids, HbA1c (if comorbid), QoL, sleep, anxiety scores	Syncope, angina, uncontrolled BP, dizziness; pause exertional practices in unstable CAD or heart failure
<b>Type 2 Diabetes &amp; metabolic syndrome</b>	<b>Tier 1:</b> Yoga, Qigong/Tai Chi, naturopathy-based lifestyle medicine (diet, sleep, activity) <b>Tier 2:</b> Ayurveda lifestyle/diet individualisation (with strict botanical governance)	HbA1c, fasting glucose, weight/waist, BP, lipids, eGFR, ACR, fatigue/QoL	Hypoglycaemia, rising HbA1c, abnormal LFTs, renal decline; stop botanicals if labs deteriorate
<b>Chronic low back pain &amp; osteoarthritis</b>	<b>Tier 1:</b> Chiropractic/osteopathy, Yoga therapy, Tai Chi <b>Tier 2:</b> Acupuncture, hypnotherapy/mind–body pain modulation	Pain score, ODI/WOMAC, mobility, analgesic use, sleep, mood	Neurological deficit, suspected fracture/infection/malignancy, worsening pain despite 6–12 weeks
<b>Irritable bowel syndrome (IBS)</b>	<b>Tier 1:</b> Gut-directed hypnotherapy, mindfulness/relaxation <b>Tier 2:</b> Yoga, acupuncture/acupressure	IBS-SSS, bowel diary, anxiety, sleep, healthcare utilisation	Weight loss, GI bleeding, anaemia, nocturnal symptoms → urgent biomedical review
<b>Cancer supportive care &amp; survivorship</b>	<b>Tier 1:</b> Acupuncture/acupressure (nausea, pain), Yoga/Tai Chi/Qigong (fatigue, sleep), hypnotherapy (procedures) <b>Tier 2:</b> Mind–body programmes (MBSR)	Pain, nausea, fatigue, sleep, mood, functional status, medication needs	Neutropenia, thrombocytopenia, infection risk; avoid needling if contraindicated; stop all non-essential supplements
<b>Anxiety, depression &amp; burnout</b>	<b>Tier 1:</b> Mind–body medicine (MBSR/relaxation), Yoga, Tai Chi/Qigong <b>Tier 2:</b> Hypnotherapy	PHQ-9, GAD-7, sleep, HRV/stress markers, function/work attendance	Suicidal ideation, psychosis, mania, functional collapse → urgent psychiatric care
<b>Long-COVID / post-viral syndromes</b>	<b>Tier 1:</b> Restorative Yoga (breath-focused), Tai Chi/Qigong, mind–body pacing strategies <b>Tier 2:</b> Acupuncture for pain, headache, sleep	Fatigue scales, post-exertional malaise, activity tolerance, sleep, QoL	Symptom worsening after exertion; stop graded activity if PEM occurs
<b>Asthma &amp; COPD (supportive)</b>	<b>Tier 1:</b> Breath-adapted Yoga, mind–body anxiety control <b>Tier 2:</b> Osteopathy (chest wall/diaphragm mechanics)	ACT/CAT scores, rescue inhaler use, exacerbation rate, spirometry	Acute exacerbation, desaturation, worsening peak flow → revert to medical escalation
<b>Chronic Pain syndromes (fibromyalgia, headache)</b>	<b>Tier 1:</b> Acupuncture, Yoga, Tai Chi, mind–body pain regulation <b>Tier 2:</b> Hypnotherapy	Pain intensity, central sensitisation scores, sleep, medication load	Increasing opioid requirement, neurological signs, red-flag headache features
<b>Frailty &amp; falls risk in older adults</b>	<b>Tier 1:</b> Tai Chi, Qigong, osteopathy/chiropractic (gentle) <b>Tier 2:</b> Mind–body confidence & fear-of-falling programmes	Falls frequency, balance tests, gait speed, ADLs, QoL	Acute falls, fractures, orthostatic hypotension, severe osteoporosis

### How to use this table clinically

- I. **Modern medicine first** – diagnosis, risk stratification, guideline therapy
- II. **Add Tier 1** integrative interventions (low risk, high benefit)
- III. **Escalate to Tier 2** if symptoms persist
- IV. **Monitor objectively + patient-reported outcomes**

Apply stop rules strictly to maintain safety and credibility

## Conclusion

This comprehensive review demonstrates that the integration of selected complementary and alternative medicine (CAM) modalities with modern biomedicine represents not a departure from scientific medicine, but an evolution toward more complete, patient-centred healthcare. While modern medicine excels in disease diagnosis, risk stratification, and acute life-saving interventions, it often leaves residual symptom burden, treatment-related adverse effects, functional impairment, and progressive organ stress—particularly in chronic, complex, and lifestyle-mediated conditions. Integrated medicine addresses these gaps by complementing biomedical precision with whole-system strategies that restore function, resilience, and quality of life. Across all modalities reviewed—Yoga, Ayurveda, Tai Chi, Qigong, acupuncture-based therapies, chiropractic, osteopathy, homeopathy, naturopathy, hypnotherapy, and mind-body medicine—remarkable convergence emerges at the level of biological and psychophysiological mechanisms. These include regulation of the autonomic nervous system, attenuation of chronic low-grade inflammation, optimisation of neuroendocrine and immune balance, modulation of central pain and symptom processing, and reinforcement of healthy behaviours such as physical activity, sleep regularity, stress management, and self-efficacy. These shared mechanisms are precisely those implicated in the development and progression of non-communicable diseases, multimorbidity, frailty, and functional decline, providing a strong scientific rationale for integration.

Importantly, this review reframes **quality of life** as a primary clinical outcome rather than a secondary or subjective endpoint. Improvements in pain, fatigue, sleep, emotional wellbeing, mobility, and coping capacity consistently observed across integrative interventions translate directly into better adherence, reduced healthcare utilisation, enhanced functional independence, and improved patient satisfaction. In this context, integrative medicine aligns clinical success with outcomes that matter most to patients and families, while remaining compatible with evidence-based medical practice. A key contribution of integrated medicine is its potential to **reduce the functional burden of treatment-related side effects and polypharmacy**. By improving symptom regulation and physiological reserves, integrative approaches can enable rational deprescribing and dose-sparing strategies in selected patients, particularly in chronic pain, mental health, metabolic disease, and oncology supportive care. This indirect reduction in medication exposure has profound implications for patient safety, especially in older adults and those with renal, gastrointestinal, or cardiovascular vulnerability.

The concept of **Organ function preservation** emerges as a unifying long-term objective of integrated care. Rather than focusing solely on end-stage disease markers, integrative medicine aims to slow functional decline by acting upstream on stress biology, inflammation, metabolic dysregulation, physical inactivity, and psychosocial distress. Through this lens, Organ function preservation encompasses maintenance of cardiovascular efficiency, metabolic stability,

musculoskeletal integrity, neurological function, immune competence, and psychological resilience—outcomes that are critical to healthy longevity but often under-addressed in conventional disease-centric models. Equally important, this review emphasises that integration must be conducted within robust ethical and clinical governance frameworks. Integrative medicine is **adjunctive, not alternative**; it does not replace essential diagnostics, pharmacotherapy, surgery, or emergency care. Safe integration requires practitioner competence and regulation, transparent communication regarding evidence and limitations, systematic outcome monitoring, and explicit stop rules to protect patients. When these principles are upheld, the benefit-risk profile of integrative approaches is favourable and compatible with modern standards of care. The disease-specific integrated care pathways presented in this article demonstrate that integration is not merely theoretical but clinically actionable. By mapping tiered integrative interventions to defined conditions, monitoring parameters, and safety triggers, these pathways offer a pragmatic blueprint for multidisciplinary teams working in primary care, secondary care, oncology, rehabilitation, mental health, and community health settings. Such frameworks also provide a foundation for service evaluation, research, and policy development.

Integrated medicine thus offers a scientifically plausible, ethically sound, and clinically practical response to some of the most pressing challenges in contemporary healthcare: chronic disease burden, polypharmacy, declining quality of life, and unsustainable health system costs. By combining the strengths of modern biomedicine with evidence-informed complementary approaches, integrated medicine supports a shift from fragmented, disease-centred care toward **whole-person, prevention-oriented, and function-preserving healthcare**. As health systems seek models that are both effective and humane, integrated medicine stands as a compelling pathway toward better outcomes for patients, clinicians, and societies alike.

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## Conflicts of interest

The authors declare that there are no conflicts of interest.

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