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The Role of Acupuncture for Long COVID: Mechanisms and Models

James E. Williams, OMD, LAc, FAAIM and Jacques Moramarco, DAOM, LAc

ABSTRACT

Objective: To establish an evidence-based role for acupuncture as a safe and effective treatment for managing Long COVID in the integrative medical setting.

Background: COVID-19 progresses to a chronic state, termed Long COVID, in about 30% of cases with estimates as high as 40% for prolonged illness. Symptoms are diverse and range over several body systems, including unrelenting fatigue, persistent malaise, chronic pain, and mood changes. Early clinical reports suggest acupuncture can effectively address both symptoms and the underlying causes of Long COVID.

Evidence: Historically, acupuncture is well defined in Traditional Chinese Medicine writings to treat influenza-like febrile illnesses. Contemporary scientific literature and case studies support the value of acupuncture for symptoms associated with acute and chronic respiratory viral infections, such as influenza, including SARS and COVID-19. Recent reports provide early evidence of acupuncture's effectiveness in managing Long COVID symptoms and may also have disease-modifying benefits.

Conclusion: Acupuncture is a viable adjunctive health care modality as part of a multidisciplinary approach for symptom control and disease management to improve quality of life in Long COVID patients. Since acupuncture may favorably modify the length and outcome of this condition, the model of acupuncture presented in this article warrants broader use in the integrative clinical setting and for further research.

Keywords: acupuncture, auricular acupuncture, Long COVID, SARS-CoV-2, COVID-19, long-haulers

INTRODUCTION

BETWEEN FEBRUARY 2020 AND SEPTEMBER 2021, 146.6 MILLION people were infected in the United States, and 124.0 million were symptomatic resulting in 921,000 deaths.¹ By mid-February 2022, deaths in the United States surpassed 1 million. Early studies found half of the patients who received mechanical ventilation died.² While the world panicked, governmental health agencies disagreed about the epidemiologic fundamentals: did natural infection provide future immune protection in the absence of vaccines, would

the high death rate occur across all age groups, and what comorbidities increased fatal outcomes? It became apparent that COVID-19 was a complex multiorgan disease with a broad spectrum of symptoms and a range of severity: from asymptomatic and mild to severe life-threatening illness. Health care providers relied on avoidance for prevention and self-quarantine with symptom management for the early stages of infection.

By mid-2021, COVID-19 vaccines were readily available in the United States. Accurate testing and improved acute care management provided better COVID-19 disease

control. Despite the benefit of vaccines in reducing severe outcomes in the most vulnerable, worldwide cases remain high with more than 6.26 million deaths. Disease activity is expected to continue through 2022 and beyond.

After acute infection comes the potential for postinfection illness. Chronic sequelae of viral infections are well known for hepatitis B and C, HIV, Ebola, and Epstein–Barr virus (EBV). It is not surprising that COVID-19 progresses to a chronic state in up to half of all cases. No one knows the actual number of post-COVID-19 cases worldwide, but estimates predict that over 100 million will have some degree of postinfection illness. Moreover, a large percentage of these will progress to Long COVID.

After the first SARS epidemic of 2003 and MERS in 2012, a similar percentage of patients experienced symptoms, some lasting up to 4 years after initial infection, and 13.7% of these patients had chronic illness 17 years after the SARS outbreak.³ The most common post-SARS syndrome symptoms were fatigue, myalgia, depression, and sleep disturbance.

Another model of protracted viral illness is myalgic encephalomyelitis (ME)/chronic fatigue syndrome (CFS), a multisymptomatic chronic condition dominated by unremitting fatigue of unknown etiology, although reactivation of latent EBV infection is considered a likely cause. Chen and other researchers found that COVID-19 can reactivate latent EBV resulting in an EBV/SARS-CoV-2 coinfection.⁴ Another study found elevated EBV IgM in COVID-19 patients.⁵ VCA IgM is the serologic marker for EBV reactivation, typically detectable only during the acute early stage of primary or in reactivated EBV infection. Further studies are needed in viral coinfection and reactivation of latent viruses, including EBV.

Similar to ME/CFS, there is no specific, safe, and effective antiviral drug to treat Long COVID. However, some long-haulers have found Paxlovid (co-packaged nirmatrelvir 150 mg and ritonavir 100 mg) alleviated some symptoms. However, although approved for use in acute COVID-19, Pfizer is not testing Paxlovid against Long COVID. Another option is the Regeneron antibody cocktail that reduces the risk of hospitalization in acute COVID-19 patients but has little to no benefit for Long COVID. Antiviral therapies that reduce virus levels in acute COVID-19 have little to no benefit when SARS-CoV-2 viral presence is absent in postinfection. However, it is possible a subset of long-haulers have persistent tissue viral load that may respond to antiviral therapy.

Typically, drug treatment for post-COVID focuses on managing symptoms and delivering supportive care. These include neurologic stimulants such as Adderall and Ritalin for fatigue and brain fog, SSRI antidepressants such as fluvoxamine to prevent clinical deterioration of mood,⁶ and inhaled Albuterol for difficulty breathing. Repurposed drugs used to treat COVID-19 include the anthelmintic Ivermectin and Type I antihistamines such as Fexofenadine but have

limited use for Long COVID. Nonpharmacologic care in the conventional medical setting includes psychological counseling, physical therapy, progressive exercises, and pulmonary rehabilitation, including breathing exercises. However, although somewhat helpful, none of these interventions significantly reduce symptoms nor alters the disease course in Long COVID.

While frontline health care workers focused on acute disease, post-COVID patients with chronic symptoms were left on their own. Out of their collective suffering, patient activists in the United Kingdom and the United States coined the term *long-haulers*, highlighting their never-ending symptoms. However, many bio-immunologic factors likely cause the broad pattern of symptoms associated with Long COVID, including incomplete cellular repair, chronic inflammatory cytokine production, pro-coagulant state, and impaired nitric oxide production. Additional factors include incomplete postviral recovery and reactivation of EBV.⁷

Since there is no medical consensus on effectively treating post-COVID, long-haulers are treating themselves with nutritional supplements, including vitamins C and D3, glutathione, herbal antimicrobials such as Echinacea, and amino acids. However, although these natural compounds may contribute to a minor improvement in energy by stimulating metabolism and for their antioxidant effects, they do not address the underlying pathophysiologic mechanisms, nor do they significantly modify the course of the disease or dramatically reduce symptoms.

Because the original SARS outbreak of 2003 and the current COVID-19 pandemic 2019 occurred in China, Traditional Chinese Medicine (TCM) and acupuncture were widely used.⁸ Studies from these cases provide ample clinical information on the use and efficacy of acupuncture. Evidence supports the favorable effects of acupuncture in other illnesses with similar symptoms, including chronic pain, fibromyalgia, CFS, and postural orthostatic tachycardia. The authors propose that acupuncture is clinically helpful, safe, and useful as a frontline therapeutic modality for treating Long COVID patients in an integrative medical setting.

DISCUSSION

COVID-19 is a multiorgan disease associated with a spectrum of clinical manifestations. The array of symptoms is related with how SARS-CoV-2 infects cells. The virus uses its protruding spike proteins to attach to a specific receptor, angiotensin-converting enzyme-II (ACE2), on a cell membrane to enter human cells. Although ACE2 is considered the primary receptor for SARS-CoV and SARS-CoV-2,⁹ additional receptors, including dipeptidyl peptidase-4 (DPP4), participate in SARS-CoV-2 infection.¹⁰ ACE2 receptors are found in the respiratory tract, which explains SARS-CoV-2's ability to cause pneumonia. But it also lines other tissues,

including the intestines, stomach, liver, pancreas, kidneys, heart, blood vessels, and the brain. This characteristic may explain the multiple organ involvement of COVID-19 and its disease complexity.¹¹ But a more complex picture emerges once the virus enters cells, and the immune system responds.

Compared with acute COVID-19, Long COVID lacks an understanding of a single unifying mechanism. Physicians, therefore, find it challenging, even impossible, to treat something without a specific cause exactly because a cause-and-effect model is inadequate to explain Long-COVID. However, TCM is inherently well adapted to address symptomatic complexity, including the postacute sequelae (PASC) associated with COVID-19 infection and the extended symptoms of Long COVID. Therefore, the lack of an obvious target or specific mechanism should not deter physicians from referring Long COVID patients for acupuncture.

Long COVID Patient Characteristics

Long COVID patients, referred to as long-haulers, are a heterogeneous group. However, women are 4 times more likely to develop Long COVID syndrome than men. A similar gender propensity occurs in ME/CFS. Peak ages to develop chronic symptoms are between 35 and 49 years compared with severe illness in acute COVID-19 patients who are mainly 65 years and older. Long-haulers may have underlying comorbidities, such as those found in acute COVID-19, including metabolic conditions, and may be overweight.¹² Long COVID, however, is not the same as PASC of SARS-CoV-2 or postintensive care illness caused by ventilation devices. Postinfection symptoms commonly persist for 4–12 weeks after onset of the disease. In contrast, Long COVID is characterized by symptoms lasting longer than 12 weeks. Long-haulers are those patients who develop a multisystem multisymptomatic condition, including autoimmunity, who do not return to a normal preinfection baseline.

Symptom Manifestations of Long COVID

Since COVID-19 affects the entire body disrupting multiple biologic systems at once, symptoms can be diverse.¹³ The most common symptom is fatigue. At least 58% of Long COVID sufferers experience severe unrelenting fatigue and malaise not improved by rest and worse with activity. Other common symptoms include headache, brain fog and memory loss, chest discomfort, and dyspnea with cough (Table 1).

The Long COVID symptom terrain is complex and extensive. Multiple surveys report as many as 200 symptoms across 10 organ systems making for a bewildering clinical landscape of signs and symptoms.¹⁴ Based on symptoms, there is general agreement as in the World Health Organization (WHO) definition, but no consensus, of a

TABLE 1. COMMON SYMPTOMS OF LONG COVID

<i>Symptom</i>	<i>Estimated percent</i>
Fatigue	58–63
Headache	44
Sleep disturbances	26
Shortness of breath (dyspnea)	24
Mood disorders (anxiety and depression)	23
Body pain (muscle pain/soreness and joint pain)	19
Brain fog (memory loss and cognitive difficulty)	16

succinct clinical definition of Long COVID. Organizing symptoms by systems helps, as is listing by clinical type including systemic presentations such as fatigue and malaise, neuropsychiatric including anxiety and depression, the musculoskeletal system with soreness, aching, and joint pain, and the cardiovascular system.

Symptoms can also be divided into 2 main categories: respiratory (e.g., cough, shortness of breath, and chest tightness) and neuropsychiatric (e.g., fatigue, brain fog, sleep disruption, depression, and anxiety). Lopez-Leon¹³ provides a percentage of 50 long-term effects of COVID-19 derived from a systematic review and meta-analysis of 15 studies. Whereas Davis¹⁵ discusses results of a survey of 3,762 participants with Long COVID extending the symptom list to include allergic reactions suggestive of overlapping mast cell activation syndrome, as well as with ME/CFS (Table 2).

Long-haulers are proactive about their condition. According to patient-based research websites such as patientresearchcovid19.com (patientresearchcovid19.com 2020), fatigue, joint and muscle pain, and dyspnea are the 3 most common symptoms. Notably, 70% of survey participants experienced waxing and waning of their symptoms, as well as the appearance of new symptoms that fluctuated in their intensity and manifest in different parts of the body.

Long COVID Disease Models

Although characterized by symptoms and signs, clinical attributes and disease predictors may be better models for understanding Long COVID. However, there are few well-defined models of the biologic factors driving symptoms. This deficiency is complicated by a lack of a definite cause of these symptoms—whether lingering or persistent, viral-induced, or immune-mediated—making it challenging to develop a consistent diagnostic criterion.

Potential pathophysiologic mechanisms of Long COVID include virus-specific damage, immunologic response abnormalities, inflammatory damage from acute infection, and microvascular thrombosis. Of these different theoretical models, persistent neuroinflammation caused by viral targeting of neuronal tissue may explain the varied symptoms stemming from dysautonomia ranging from alterations in temperature, blood pressure, heart rhythm,

TABLE 2. COMMON LONG-COVID SYMPTOMS AND CONDITIONS ACCORDING TO ORGAN SYSTEMS

<i>Systemic</i>	<i>Neuropsychiatric</i>	<i>Musculoskeletal</i>	<i>Respiratory</i>	<i>Cardiovascular</i>	<i>Endocrine</i>
Fatigue	Anxiety	Myalgia	Dyspnea	Arrhythmias	Diabetes type 2
Malaise	Depression	Arthralgia	Shortness of breath	Tachycardia	Hypo- or hyperthyroidism
Postexertion tiredness and weakness	Sleep disruption	Fibromyalgia	Reduced exercise capacity	Chest pain and/or discomfort	Bone demineralization
Reduced exercise capacity	Brain fog		Hypoxia		HPA axis disruption
Hair loss	Headache				

HPA.

gastrointestinal motility, and energy. Muscle aches and deep bone and joint pain, so common in ME/CFS, go largely unexplained in Long COVID (Table 3).

Proal and VanElzakker¹⁶ present the concept that a range of biologic factors contributes to postviral consequences that make for the clinical pattern of Long COVID. These factors include delayed healing from acute SARS-CoV-2 tissue injury, persistent viral reservoirs, viral interaction with the host microbiome, abnormal coagulation function, imbalanced vagal nerve signaling, and autoimmunity—all driving multiorgan subacute injury triggering inflammatory processes.

Similarities between Long COVID and ME/CFS, both disorders linked to EBV infection, are apparent in the clinical presentation of Long COVID patients. The original SARS-CoV-2 infection could reactivate latent viruses, including enteroviruses such as EBV and coxsackie A/B, herpesviruses such as HHV-6, and cytomegalovirus. Both ME/CFS and Long COVID have similar clinical presentations, with persistent fatigue dominating, and may share a common pathophysiology, including acute hypoxia in tissues with high oxygen demand similar to the brain, reduced mitochondrial nitric oxide system function resulting in lower energy output, redox imbalances,¹⁷ and impaired nitric oxide processes in critical tissue such as the lungs.¹⁸

Townsend¹⁹ hypothesized that pulmonary microvascular immunothrombosis may be involved in Long COVID pathogenesis. The evaluation was based on chest pain,

shortness of breath, and computed tomography pulmonary angiogram. Findings demonstrated an elevation in D-dimer as a common finding in COVID-19 patients during convalescence and seen at least 4 months after resolution of acute COVID-19.²⁰ However, Long COVID patients at the authors' integrative medical center, with symptomatic illness longer than 4 months, for the most part have normal D-dimer levels, even if D-dimer was elevated in their acute infection phase. However, in the authors' clinical experience, C-reactive protein (CRP) is high in the acute phase and often remains elevated in the chronic, Long COVID phase. Gameil et al. found persistent biochemical residue after acute COVID-19 recovery, including erythrocyte sedimentation rate (ESR), CRP, D-dimer, and ferritin.²¹

Another theory of Long COVID is that a low-grade inflammatory state produced by chronic persistent cytokine expression causes neuroinflammation, principally in the brain and brain stem. Most acute COVID-19 patients have elevated CRP and high D-dimer. As their condition resolves, these markers normalize. However, Long COVID patients may have persistently elevated CRP, with or without high D-dimer. This finding is consistent with what the authors see in patients at their integrative medical center. Successful disease management of these cases results in normalization of CRP and other markers of inflammation, including NT-proB-type natriuretic peptide, ferritin, interleukin-6 (IL-6), and procalcitonin.²²

Acupuncture Mechanisms for Long-COVID

TCM theory explains that acupuncture works by restoring the normal flow of qi, blood, and body fluids; it regulates the relationship of yin and yang of the organ systems and meridians. TCM also describes the abnormal or persistent influence of environmental factors such as cold, heat, and dampness that disrupt the healthy flow of qi and organ function. This classical approach is a valuable guide for choosing acupuncture points; however, evidence-based medical acupuncture may have more value for point selection in the integrative medical setting for the effective treatment and management of Long COVID. Studies in how acupuncture influences bodily functions indicate that it alleviates many

TABLE 3. LONG-COVID THEORIES

<i>Disease models</i>	<i>Authors</i>
Multiorgan multiple nonspecific factors	Proal and VanElzakker
Persistent neuroinflammation	
Latent viral reactivation	
Pulmonary microvascular immunothrombosis	Townsend
Reduced mitochondrial nitric oxide system function	Stefano
Nitric oxide	Offringa
Autonomic instability	Dani
Redox imbalance	Paul

of the effects of COVID-19, including lowering inflammation, modulating the adaptive immune response, and influencing nitric oxide production. Disruption of these functions and their lack of a return to normal baselines are characteristic of Long COVID (Table 4).

Vagal Tone Regulation. Modern research informs that acupuncture works in multiple physiologic ways, including regulation of the vagus nerve: interfacing with the parasympathetic control of the heart, lungs, and digestive system organs. After leaving the brain stem, the vagus nerve exits the cranium through the jugular foramen, dividing into left and right branches much similar to the acupuncture meridian system. Acupoints that regulate autonomic tone include PC 6 (*Neiguan*) and ST 36 (*Zusanli*). Stimulation at these points transmit signals through the vagus nerve to mediate the anti-inflammatory response.²² Shen demonstrated acupuncture's ability to modulate cardiac arrhythmias,²³ and Boehmer found the auricular vagus nerve point can regulate heart rate.²⁴

Chronic Inflammation Management. Evidence suggests elevated IL-6 is an independent risk factor for disease severity in acute COVID-19. Patients with increased mortality rates tend to have high IL-6.²⁵ Theoretically, blocking viral replication and using anti-inflammatories shorten the duration of illness and limits damage from inflammatory responses.²⁶ But there is little indication that IL-6 persists in Long COVID.²⁷ Therefore, cytokines may not be helpful as treatment targets. However, since the dysfunction of autonomic tone is linked to cytokine release syndrome during the acute phase, regulating the autonomic nervous system with acupuncture could play a role in maintaining both cardiovascular homeostasis and modulating inflammatory activity.²⁸ A mechanism of acupuncture in the treatment of sepsis is strengthening the vagus-cholinergic anti-inflammatory pathways to weaken the cytokine storm.²⁹

Stimulation of ST36 (*Zusanli*), LI4 (*Hegu*), and LR3 (*Taichong*) have dual immune modulating and anti-inflammatory effects. Macrophage polarization occurs by environmental stimulation, including acupuncture needles, helping modulate pro-inflammatory cytokines, including tumor necrosis factor α , and interleukins 12, 23, 6, and 1 β .

TABLE 4. MODELS OF HOW ACUPUNCTURE IMPROVES LONG-COVID OUTCOMES

Regulates vagal tone
Manages chronic inflammation
Manages vasoconstriction
Improves NO
Modulates ROS
Reduces viral replication and improves adaptive immunity
Improves autonomic NS balance

NO, nitric oxide; NS; ROS, reactive oxygen species.

Macrophages involved in promoting inflammation contribute to disease progression. Downregulating inflammatory molecules exerts a modifying influence on inflammation, promoting improved disease tolerance.³⁰

Electroacupuncture can reduce the expression of proinflammatory cytokines and modulate immunity through neuroregulation.³¹ Vagus nerve stimulation by implanted devices shows promise in improving outcomes in COVID-19 patients.²⁷

Since Townsend found at least a quarter of patients had D-dimer levels of <500 ng/mL up to 4 months after diagnosis of acute infection, initial laboratory testing should include D-dimer 17 and quantitative CRP, as well as ferritin and the ESR. Monitoring acupuncture anti-inflammatory benefits by ordering D-dimer and CRP studies after a series of acupuncture is advisable. In the practice of one of the authors (J.E.W.), they found that D-dimer and CRP normalize overtime with acupuncture.

Nitric Oxide Normalization. Nitric oxide (NO) plays an essential role in both the cardiopulmonary and immune systems. COVID-19 infection can lower NO due to tissue destruction by reactive oxygen species (ROS), which are increased during acute COVID-19.³² Acupuncture may decrease ROS production and restore oxidative-antioxidant balance. Tsuchiya³³ demonstrated that acupuncture could raise NO levels and thereby increase not only local circulation but also lower viral replication and improve the adaptive immune response. Acupuncture can enhance host-to-disease interaction, favoring increasing NO for restoring adaptive immunity.³⁴ It may reduce inflammatory distress, modulate ROS, and restore autonomic tone. Tissue damage from infection inevitably produces ROS. Inflammatory factors and ROS can enter the brain and invade vascular and other tissue. Acupuncture can reduce oxidative stress and suppress inflammation.³⁵

Microcirculation. SARS-CoV-2 not only attacks the respiratory tract, but it also invades the heart and vessels, causing micro-clots, endotheliitis, and inhibits normal angiogenesis and cardiovascular regeneration. Compromised blood flow reduces tissue oxygenation, including to the brain that may contribute to brain fog, a common symptom among long-haulers and CFS patients.

Acupuncture stimulation modulates microcirculation although releasing nitric oxide and calcitonin gene-related factor. Strong stimulation by manual needle manipulation at LI4, the source point of the large intestine meridian, is a classical point for "moving the qi."³⁶ Synergistic points with LI4 for microcirculatory benefits include LI10 or LI11, SP9, ST25, ST36, SP6, and LR3.

Acupuncture Point Selection. The most used acupoints in China for COVID-19 include ST 36 (*zhusanli*), LI 4 (*hegu*), PC 6 (*neiguan*), and KI 3 (*taixi*).³⁷ Supportive

acupoints include SP 6 (*sanyinjiao*), KI 7 (*fuliu*), CV 20 (*huigai*), SP 10 (*xuehai*), and LR 3 (*taichong*) that enhance the treatment effect, and target-specific symptoms, such as brain fog with GV 20 (*Baihui*), or specific organs such as with LR 3, the source point of the liver meridian, when liver organ function test results are abnormal.

Early in the pandemic, a WHO-China Joint Mission provided guidance for TCM and acupuncture-moxibustion separated into 3 stages: (1) an observation stage for suspected cases, (2) an intervention stage for confirmed cases, and (3) the recovery stage to clear residual toxins and restore lung and spleen *qi* and support *yin* deficiency marked by fatigue and shortness of breath. The primary acupoints used for the recovery stage were ST 36, PC 6, CV 6 and 12, and ST 25. Supportive acupoints were selected based on symptoms, including shortness of breath with CV 17, BL 13, and LU 1. In addition, CV17 located in the center of the chest may stimulate thymic activity (Table 5).²²

Auricular Acupuncture. Acupuncture outcomes for Long COVID may be improved when adding auricular points. A 2022 meta-analysis found auricular acupuncture effective in relieving anxiety and depression in COVID-19 patients.³⁸

From the mid-1980s to 1990s, one of the authors (J.M.) and Dr. Terry Oleson treated HIV/AIDS patients with auricular acupuncture at the thymus point, located on the concha wall in zone CW6 according to Oleson's nomenclature. Subjectively, patients experienced an increased sense of well-being. Electrical stimulation can enhance the therapeutic effect. Low-level transcutaneous electrical stimulation of the auricular point corresponding to the auricular branch of the vagus nerve, inferior to the tragus, lowers rapid heart rate by way of an indirect parasympathetic effect.²⁴

The scientific acupuncture team of the Paris XI University, France, found that stimulation of the Interferon Point, found on the tragus and ascending branch of the helix of the ear, improved immune defenses in viral infection and helped accelerate remission in acute COVID-19.³⁹ According to Oleson, morphologic tissue changes in acute COVID-19 have been observed at the Interferon Point.⁴⁰

TABLE 5. ACUPOINT FORMULAS

<i>Acupoints</i>	<i>Indications</i>	<i>Supportive points</i>
ST 36 with SP 6	Fatigue	LI 10
ST 36 with KI 7	Fatigue with kidney involvement	SP 6
ST 36 with CV 20	Fatigue with dull headache and brain fog	LI 4, LR 3
LI 4 with SP 10	Coagulation issues	LR 3
LI 4 with LR 3	Elevated liver enzymes	GB 34, CV12/13
LI 4 with ST 36	Inflammation	LI 11

Along with the Interferon Point, consider the Thymus, Neurogate, and Point Zero auricular points.

Auricular acupuncture may also prophylactically reduce stress, promotes healthy sleep, and support viral immunity. A Brazilian study⁴¹ found that health care workers, including doctors and nurses, benefitted from auriculotherapy to the “cybernetic triangle,” a cluster of 3 ear points: Neurogate, Kidney, and Sympathetic. A study of 84 patients in Hubei, China, found auricular point pressure involving seed (*Vaccaria segetalis*) placement improved sleep and reduced situational anxiety.⁴² Ear point stimulation to reduce anxiety may benefit to long-haulers anxious about ever getting better.

Traditional Chinese Acupuncture Insights. From the classical perspective, acupuncture moves the *qi* and blood. It modulates the acupuncture meridians, collateral vessels, and blood vessels. And it calms the *shen*, the spirit. Patients report an improved sense of well-being after acupuncture treatment. They sleep better. They are less tense. Headaches and other common aches and pain diminish. Patients who receive weekly acupuncture during cold and flu season have fewer infections. The authors realize that these are anecdotal findings, but they are clinically real and repeatable.

Classical acupuncture, using an individualized combination of points, combined with modern evidence-based point selection work for managing symptoms, improve emotional wellness and enhancing immunity. Many traditional acupoints have affinity for specific tissues: BL17 (*Geshu*), the “diaphragm control point” exerts an influence on internal bleeding, SP10 (*Xuehai*) the “sea of blood” improves blood flow, and GB39 (*Xuanzhong*) the “sea of marrow” supports the production of healthy blood. CV17 (*Shangzhong*) in the center of the chest sits over the region of the thymus gland. It supports healthy cardiovascular health and respiratory function, and benefits immunity.

CONCLUSION

Recovering from Long COVID takes time. It is a complicated illness with vacillating symptoms and suffering does not stop after the initial infection. The pathogenesis of acute COVID-19 differs significantly from Long COVID. Symptoms persist beyond 12 weeks after initial SARS-CoV-2 infection and can go on for months to years. Because the diverse range of symptoms spans multiple organ systems, acupuncture is an ideal therapy for disease modification. But the understanding of acupuncture's pathophysiology and therapeutic mechanisms for postviral illness is incomplete; however, recent studies and clinical evidence suggest considerable potential for medical acupuncture in treating Long COVID. Acupuncture may be particularly

well suited for outpatient care in managing Long COVID, pending appropriate research studies to substantiate its therapeutic values.

Medical acupuncture can shorten posthospitalization recovery time, improve symptoms, and influence many of the causes of Long COVID, including modulating inflammation, restoring healthy nitric oxide production, adjusting redox imbalance, and regulating blood pressure to help positively influence disease outcome. Although it is too early in the history of the illness to know how many Long COVID cases will resolve independently, it is time to employ safe nontoxic therapies such as acupuncture. Unlike drugs, acupuncture has regulatory effects making it less likely to harm patients but with a significant potential for favorable outcomes.

A 2021 bioinformatics study⁴³ demonstrated that acupuncture exerts an overall regulatory role through multi-target effects. The body systems influenced by acupuncture include interconnections between neuroimmune functions. Acupuncture can alleviate many of the clinical symptoms of COVID-19, including headaches, myalgia, and abdominal pain. Proactive care and treatment with acupuncture may be central to a comprehensive Long COVID clinical strategy.

In conclusion, the collective physiologic and psychologic actions of acupuncture on the body–mind reduce suffering, promote metabolism and energy, and improves well-being. And importantly for those experiencing Long COVID, it improves disease tolerance, a strategy that does not exert a direct impact on pathogens but is essential to limit the impact of infection and restore health.

ETHICAL APPROVAL

This article does not require ethics approval since it does not use human or animals. It is a review of previously published information freely available in the public domain.

ABOUT THE AUTHORS

J.E.W. is the author of *Viral Immunity* and *Beating the Flu* and teaches at Emperor's College. He has extensive experience in the treatment of ME/CFS and chronic viral infections. J.M. is the author of *The Complete Ginseng Handbook* and *The Way of Walking: Eastern Strategies for Vitality, Longevity, and Peace of Mind*. He is an expert in auricular acupuncture. He is the academic dean at Emperor's College.

AUTHOR DISCLOSURE STATEMENT

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Address correspondence to:

James E. Williams, OMD, FAAIM
 Florida Integrative Medical Center
 2415 University Parkway, Building 3, Suite 218
 Sarasota, FL 34343
 USA

E-mail: drwilliams@drjewilliams.com