

Long-COVID Update #6



July 2023

Welcome to the latest edition of the Long-Covid Update. The aim of this publication is to bring together a range of recently published research and guidance that will help you make evidence-based decisions.

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Please contact Holly if you would like more information, or further evidence searches: holly.cook3@nhs.net.

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1. Clinical improvement of Long-COVID is associated with reduction in autoantibodies, lipids, and inflammation following therapeutic apheresis

Item Type: Journal Article

Authors: Achleitner, Martin;Steenblock, Charlotte;Dänhardt, Juliane;Jarzebska, Natalia;Kardashi, Romina;Kanczkowski, Waldemar;Straube, Richard;Rodionov, Roman N.;Bornstein, Nitzan;Tselmin, Sergey;Kaiser, Frank;Bucher, Ronald;Barbir, Mahmoud;Wong, Ma-Li;Voit-Bak, Karin;Licinio, Julio and Bornstein, Stefan R.

Publication Date: 2023

Journal: Molecular Psychiatry

Abstract: In the aftermath of the COVID-19 pandemic, we are witnessing an unprecedented wave of post-infectious complications. Most prominently, millions of patients with Long-Covid complain about chronic fatigue and severe post-exertional malaise. Therapeutic apheresis has been suggested as an efficient treatment option for alleviating and mitigating symptoms in this desperate group of patients. However, little is known about the mechanisms and biomarkers correlating with treatment outcomes. Here, we have analyzed in different cohorts of Long-Covid patients specific biomarkers before and after therapeutic apheresis. In patients that reported a significant improvement following two cycles of therapeutic apheresis, there was a significant reduction in neurotransmitter autoantibodies, lipids, and inflammatory markers. Furthermore, we observed a 70% reduction in fibrinogen, and following apheresis, erythrocyte rouleaux formation and fibrin fibers largely disappeared as demonstrated by dark field microscopy. This is the first study demonstrating a pattern of specific biomarkers with clinical symptoms in this patient group. It may therefore form the basis for a more objective monitoring and a clinical score for the treatment of Long-Covid and other postinfectious syndromes. (© 2023. The Author(s).)

Access or request full text: <https://libkey.io/10.1038/s41380-023-02084-1>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37131073&custid=ns023446>

2. Cardiovascular and autonomic dysfunction in long-COVID syndrome and the potential role of non-invasive therapeutic strategies on cardiovascular outcomes

Item Type: Journal Article

Authors: Allendes, Francisca J.;Díaz, Hugo,S.;Ortiz, Fernando C.;Marcus, Noah J.;Quintanilla, Rodrigo;Inestrosa, Nibaldo C. and Del Rio, Rodrigo

Publication Date: 2023

Journal: Frontiers in Medicine 9, pp. 1095249

Abstract: A significant percentage of COVID-19 survivors develop long-lasting cardiovascular sequelae linked to autonomic nervous system dysfunction, including fatigue, arrhythmias, and hypertension. This post-COVID-19 cardiovascular syndrome is one facet of "long-COVID," generally defined as long-term health problems persisting/appearing after the typical recovery period of COVID-19. Despite the fact that this syndrome is not fully

understood, it is urgent to develop strategies for diagnosing/managing long-COVID due to the immense potential for future disease burden. New diagnostic/therapeutic tools should provide health personnel with the ability to manage the consequences of long-COVID and preserve/improve patient quality of life. It has been shown that cardiovascular rehabilitation programs (CRPs) stimulate the parasympathetic nervous system, improve cardiorespiratory fitness (CRF), and reduce cardiovascular risk factors, hospitalization rates, and cognitive impairment in patients suffering from cardiovascular diseases. Given their efficacy in improving patient outcomes, CRPs may have salutary potential for the treatment of cardiovascular sequelae of long-COVID. Indeed, there are several public and private initiatives testing the potential of CRPs in treating fatigue and dysautonomia in long-COVID subjects. The application of these established rehabilitation techniques to COVID-19 cardiovascular syndrome represents a promising approach to improving functional capacity and quality of life. In this brief review, we will focus on the long-lasting cardiovascular and autonomic sequelae occurring after COVID-19 infection, as well as exploring the potential of classic and novel CRPs for managing COVID-19 cardiovascular syndrome. Finally, we expect this review will encourage health care professionals and private/public health organizations to evaluate/implement non-invasive techniques for the management of COVID-19 cardiovascular sequelae.; Competing Interests: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. (Copyright © 2023 Allendes, Díaz, Ortiz, Marcus, Quintanilla, Inestrosa and Del Rio.)

Access or request full text: <https://libkey.io/10.3389/fmed.2022.1095249>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36743679&custid=ns023446>

3. 'I don't know what to do or where to go'. Experiences of accessing healthcare support from the perspectives of people living with Long Covid and healthcare professionals: A qualitative study in Bradford, UK

Item Type: Journal Article

Authors: Baz, Sarah A.;Fang, Chao;Carpentieri, J. D. and Sheard, Laura

Publication Date: 2023

Journal: Health Expectations : An International Journal of Public Participation in Health Care and Health Policy 26(1), pp. 542-554

Abstract: Background: In October 2022, it was estimated 2.3 million people in the United Kingdom have self-reported Long Covid (LC). Many people have reported not receiving adequate healthcare support. There is a lack of research which provides an in-depth exploration of the barriers faced by people with LC in accessing healthcare support. It is important to understand these barriers to provide better support, care and advice for those experiencing LC.; Objective: To understand the barriers faced in accessing primary, secondary and specialist healthcare support for people with LC.; Design and Participation: 40 interviews were conducted with people living with LC in Bradford alongside 12 interviews with healthcare professionals (HCPs) providing LC support in Bradford healthcare settings. Interviews were analysed using reflexive thematic analysis.; Results: People living with LC had a large degree of difficulty in accessing healthcare services for LC support. We categorized the healthcare access experiences of participants into five main types: (1) being unable to access primary care, (2) accessing primary care but receiving (perceived) inadequate support, (3) extreme persistence, (4) alternatives to mainstream health care and (5) positive experiences. There was a severe lack of access to specialist LC services. Ethnic minority participants faced a further barrier of mistrust and fear of services deterring them from accessing support. HCPs discussed systemic barriers to delivering services. Experiences were embedded in macrostructural issues further exacerbated by the pandemic.; Conclusion: To better support people with LC, the barriers faced in accessing healthcare support must be addressed. Of significance, improvements to general practitioner access are required; especially as GPs are the first line of support for people living with LC.; Patient and Public Involvement: A patient and public involvement group is engaged at regular intervals in the project. (© 2022 The Authors. Health Expectations published by John Wiley &

Sons Ltd.)

Access or request full text: <https://libkey.io/10.1111/hex.13687>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36512382&custid=ns023446>

4. Youth Mental Health Outcomes up to Two Years After SARS-CoV-2 Infection Long-COVID or Long-Pandemic Syndrome: A Retrospective Cohort Study

Item Type: Journal Article

Authors: Bilu, Yonatan;Flaks-Manov, Natalie;Goldshtein, Inbal;Bivas-Benita, Maytal;Akiva, Pinchas;Bodenheimer, Gilad and Greenfeld, Shira

Publication Date: 2023

Journal: The Journal of Adolescent Health : Official Publication of the Society for Adolescent Medicine

Abstract: Purpose: Youth mental distress has substantially increased during the COVID-19 pandemic. However, it is unclear if mental symptoms are directly related to SARS-CoV-2 infection or to social restrictions. We aimed to investigate mental health outcomes in infected versus uninfected adolescents, for up to two years after an index polymerase chain reaction (PCR) test.; Methods: A retrospective cohort study, based on electronic health records from a large nationally representative Israeli health fund, among adolescents aged 12-17 years with a PCR test for SARS-CoV-2 between March 1, 2020 and March 1, 2021. Infected and uninfected individuals were matched by age, sex, test date, sector, and socioeconomic status. Cox regression was used to derive hazard ratios (HRs) for mental health outcomes within two years from PCR test for infected versus uninfected individuals, while accounting for pre-existing psychiatric history. External validation was performed on UK primary care data.; Results: Among 146,067 PCR-tested adolescents, 24,009 were positive and 22,354 were matched with negative adolescents. SARS-CoV-2 infection was significantly associated with reduced risks for dispensation of antidepressants (HR 0.74, 95% confidence interval CI] 0.66-0.83), diagnoses of anxiety (HR 0.82, 95% CI 0.71-0.95), depression (HR 0.65, 95% CI 0.53-0.80), and stress (HR 0.80, 95% CI 0.69-0.92). Similar results were obtained in the validation dataset.; Discussion: This large, population-based study suggests that SARS-CoV-2 infection is not associated with elevated risk for mental distress in adolescents. Our findings highlight the importance of taking a holistic view on adolescents' mental health during the pandemic, with consideration of both SARS-CoV-2 infection and response measures. (Copyright © 2023 Society for Adolescent Health and Medicine. Published by Elsevier Inc. All rights reserved.)

Access or request full text: <https://libkey.io/10.1016/j.jadohealth.2023.05.022>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37389526&custid=ns023446>

5. Pre-assessment and management of long COVID patients requiring elective surgery: challenges and guidance

Item Type: Journal Article

Authors: Boles, Sophie and Ashok, Sundar Raj

Publication Date: 2023

Journal: Perioperative Medicine (London, England) 12(1), pp. 20

Abstract: Whilst most patients infected with COVID-19 make a full recovery, around 1 in 33 patients in the UK report ongoing symptoms post-infection, termed 'long COVID'. Studies have demonstrated that infection with early COVID-19 variants increases postoperative mortality and pulmonary complications for around 7 weeks after acute infection. Furthermore, this increased risk persists for those with ongoing symptoms beyond 7 weeks. Patients with long COVID may therefore also be at increased postoperative risk, and despite the significant prevalence of long COVID, there are minimal guidelines on how best to assess and manage these patients perioperatively. Long COVID shares several clinical and pathophysiological similarities with conditions such as myalgic encephalitis/chronic fatigue syndrome and postural tachycardia syndrome; however, there are no current guidelines for the preoperative management of these patients to help develop something similar for long COVID patients. Developing guidelines for long COVID patients is further complicated by its heterogenous presentation and pathology. These patients can have persistent abnormalities on pulmonary function tests and echocardiography 3 months after acute infection, correlating with a reduced functional capacity. Conversely, some long COVID patients can continue to experience symptoms of dyspnoea and fatigue despite normal pulmonary function tests and echocardiography, yet demonstrating significantly reduced aerobic capacity on cardiopulmonary exercise testing even a year after initial infection. How to comprehensively risk assess these patients is therefore challenging. Existing preoperative guidelines for elective patients with recent COVID-19 generally focus on the timing of surgery and recommendations for pre-assessment if surgery is required before this time interval has elapsed. How long to delay surgery in those with ongoing symptoms and how to manage them perioperatively are less clear. We suggest that multidisciplinary decision-making is required for these patients, using a systems-based approach to guide discussion with specialists and the need for further preoperative investigations. However, without a better understanding of the postoperative risks for long COVID patients, it is difficult to obtain a multidisciplinary consensus and obtain informed patient consent. Prospective studies of long COVID patients undergoing elective surgery are urgently required to help quantify their postoperative risk and develop comprehensive perioperative guidelines for this complex patient group. (© 2023. The Author(s).)

Access or request full text: <https://libkey.io/10.1186/s13741-023-00305-3>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37277879&custid=ns023446>

6. Therapeutic trials for long COVID-19: A call to action from the interventions taskforce of the RECOVER initiative

Item Type: Journal Article

Authors: Bonilla, Hector;Peluso, Michael J.;Rodgers, Kathleen;Aberg, Judith A.;Patterson, Thomas F.;Tamburro, Robert;Baizer, Lawrence;Goldman, Jason D.;Roupael, Nadine;Deitchman, Amelia;Fine, Jeffrey;Fontelo, Paul;Kim, Arthur Y.;Shaw, Gwendolyn;Stratford, Jeran;Ceger, Patricia;Costantine, Maged M.;Fisher, Liza;O'Brien, Lisa;Maughan, Christine, et al

Publication Date: 2023

Journal: Frontiers in Immunology 14, pp. 1129459

Abstract: Although most individuals recover from acute SARS-CoV-2 infection, a significant number continue to suffer from Post-Acute Sequelae of SARS-CoV-2 (PASC), including the unexplained symptoms that are frequently referred to as long COVID, which could last for weeks, months, or even years after the acute phase of illness. The National Institutes of Health is currently funding large multi-center research programs as part of its Researching COVID to Enhance Recover (RECOVER) initiative to understand why some individuals do not recover fully from COVID-19. Several ongoing pathobiology studies have provided clues to potential mechanisms contributing to this condition. These include persistence of SARS-CoV-2 antigen and/or genetic material, immune dysregulation, reactivation of other latent viral infections, microvascular dysfunction, and gut dysbiosis, among others. Although our understanding of the causes of long COVID remains incomplete, these early pathophysiological studies suggest biological pathways

that could be targeted in therapeutic trials that aim to ameliorate symptoms. Repurposed medicines and novel therapeutics deserve formal testing in clinical trial settings prior to adoption. While we endorse clinical trials, especially those that prioritize inclusion of the diverse populations most affected by COVID-19 and long COVID, we discourage off-label experimentation in uncontrolled and/or unsupervised settings. Here, we review ongoing, planned, and potential future therapeutic interventions for long COVID based on the current understanding of the pathobiological processes underlying this condition. We focus on clinical, pharmacological, and feasibility data, with the goal of informing future interventional research studies.; Competing Interests: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. (Copyright © 2023 Bonilla, Peluso, Rodgers, Aberg, Patterson, Tamburro, Baizer, Goldman, Roupheal, Deitchman, Fine, Fontelo, Kim, Shaw, Stratford, Ceger, Costantine, Fisher, O'Brien, Maughan, Quigley, Gabbay, Mohandas, Williams and McComsey.)

Access or request full text: <https://libkey.io/10.3389/fimmu.2023.1129459>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36969241&custid=ns023446>

7. Characterising patterns of COVID-19 and long COVID symptoms: evidence from nine UK longitudinal studies

Item Type: Journal Article

Authors: Bowyer, Ruth C. E.;Huggins, Charlotte;Toms, Renin;Shaw, Richard J.;Hou, Bo;Thompson, Ellen J.;Kwong, Alex S. F.;Williams, Dylan M.;Kibble, Milla;Ploubidis, George B.;Timpson, Nicholas J.;Sterne, Jonathan A. C.;Chaturvedi, Nishi;Steves, Claire J.;Tilling, Kate and Silverwood, Richard J.

Publication Date: 2023

Journal: European Journal of Epidemiology 38(2), pp. 199-210

Abstract: Multiple studies across global populations have established the primary symptoms characterising Coronavirus Disease 2019 (COVID-19) and long COVID. However, as symptoms may also occur in the absence of COVID-19, a lack of appropriate controls has often meant that specificity of symptoms to acute COVID-19 or long COVID, and the extent and length of time for which they are elevated after COVID-19, could not be examined. We analysed individual symptom prevalences and characterised patterns of COVID-19 and long COVID symptoms across nine UK longitudinal studies, totalling over 42,000 participants. Conducting latent class analyses separately in three groups ('no COVID-19', 'COVID-19 in last 12 weeks', 'COVID-19 > 12 weeks ago'), the data did not support the presence of more than two distinct symptom patterns, representing high and low symptom burden, in each group. Comparing the high symptom burden classes between the 'COVID-19 in last 12 weeks' and 'no COVID-19' groups we identified symptoms characteristic of acute COVID-19, including loss of taste and smell, fatigue, cough, shortness of breath and muscle pains or aches. Comparing the high symptom burden classes between the 'COVID-19 > 12 weeks ago' and 'no COVID-19' groups we identified symptoms characteristic of long COVID, including fatigue, shortness of breath, muscle pain or aches, difficulty concentrating and chest tightness. The identified symptom patterns among individuals with COVID-19 > 12 weeks ago were strongly associated with self-reported length of time unable to function as normal due to COVID-19 symptoms, suggesting that the symptom pattern identified corresponds to long COVID. Building the evidence base regarding typical long COVID symptoms will improve diagnosis of this condition and the ability to elicit underlying biological mechanisms, leading to better patient access to treatment and services. (© 2023. The Author(s).)

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URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36680646&custid=ns0234>

8. Effect of covid-19 vaccination on long covid: systematic review

Item Type: Journal Article

Authors: Byambasuren, Oyungerel;Stehlik, Paulina;Clark, Justin;Alcorn, Kylie and Glasziou, Paul

Publication Date: 2023

Journal: BMJ Medicine 2(1), pp. e000385

Abstract: Objective: To determine the effect of covid-19 vaccination, given before and after acute infection with the SARS-CoV-2 virus, or after a diagnosis of long covid, on the rates and symptoms of long covid.; Design: Systematic review.; Data Sources: PubMed, Embase, and Cochrane covid-19 trials, and Europe PubMed Central (Europe PMC) for preprints, from 1 January 2020 to 3 August 2022.; Eligibility Criteria for Selecting Studies: Trials, cohort studies, and case-control studies reporting on patients with long covid and symptoms of long covid, with vaccination before and after infection with the SARS-CoV-2 virus, or after a diagnosis of long covid. Risk of bias was assessed with the ROBINS-I tool.; Results: 1645 articles were screened but no randomised controlled trials were found. 16 observational studies from five countries (USA, UK, France, Italy, and the Netherlands) were identified that reported on 614 392 patients. The most common symptoms of long covid that were studied were fatigue, cough, loss of sense of smell, shortness of breath, loss of taste, headache, muscle ache, difficulty sleeping, difficulty concentrating, worry or anxiety, and memory loss or confusion. 12 studies reported data on vaccination before infection with the SARS-CoV-2 virus, and 10 showed a significant reduction in the incidence of long covid: the odds ratio of developing long covid with one dose of vaccine ranged from 0.22 to 1.03; with two doses, odds ratios were 0.25-1; with three doses, 0.16; and with any dose, 0.48-1.01. Five studies reported on vaccination after infection, with odds ratios of 0.38-0.91. The high heterogeneity between studies precluded any meaningful meta-analysis. The studies failed to adjust for potential confounders, such as other protective behaviours and missing data, thus increasing the risk of bias and decreasing the certainty of evidence to low.; Conclusions: Current studies suggest that covid-19 vaccines might have protective and therapeutic effects on long covid. More robust comparative observational studies and trials are needed, however, to clearly determine the effectiveness of vaccines in preventing and treating long covid.; Protocol Registration: Open Science Framework <https://osf.io/e8jdy>.; Competing Interests: Competing interests: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/disclosure-of-interest/ and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work. (© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.)

Access or request full text: <https://libkey.io/10.1136/bmjmed-2022-000385>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36936268&custid=ns023446>

9. A retrospective study of patients presenting with speech and language therapy needs within multidisciplinary Long COVID services: A service evaluation describing and comparing two cohorts across two NHS Trusts

Item Type: Journal Article

Authors: Chalmers, Sophie;Harrall, Kate;Wong, Sze Yin;Kablan, Widad and Clunie, Gemma

Publication Date: 2023

Journal: International Journal of Language & Communication Disorders

Abstract: Background: Post-COVID Syndrome (also known as Long COVID) refers to the multi-system condition affecting individuals following COVID-19 infection. This can include speech and language therapy (SLT) needs, including voice, swallowing, communication and upper airway difficulties. There is limited published literature in this clinical area of practice, particularly for those receiving input from community SLT services.; Aims: To describe and compare demand, typical SLT presentation and service delivery across two National Health Service (NHS) Long COVID multidisciplinary services. Independent retrospective service evaluation was completed for each service. Descriptive statistics were produced and compared across services. This service evaluation followed The Strengthening the Reporting of Observation Studies in Epidemiology guidelines for cohort studies.; Outcomes & Results: The findings indicated similarities across the two services in SLT service need and demand, clinical presentations and intervention approaches provided within Long COVID services. There were specific differences in the service provision and delivery of intervention in cognitive communication and upper airways subspecialties.; Conclusions & Implications: This study highlights the clinical complexities of SLT needs in individuals with Long COVID and the importance for an appropriately skilled and supported workforce within effective multidisciplinary teams. We call for consensus on SLT practices and a consistent and standardized approach to evaluation for SLT needs in Long COVID.; What This Paper Adds: What is already known on this subject SLT needs, including voice, swallowing, communication and upper airway difficulties, are present in individuals presenting with Long COVID, both in those who were or were not hospitalized. SLTs are seeing such individuals in a variety of settings, including community services and Long COVID multidisciplinary teams. There is minimal evidence of the clinical presentations and interventions provided to individuals with SLT needs compared across Long COVID services. What this study adds to existing knowledge This study compares two NHS Long COVID services providing a SLT service pathway. It highlights the similarities and differences in service demand and capacity, patient presentation, and SLT intervention to make suggestions for future practice consideration and priority evaluation. Expert consensus among SLT clinicians is a priority to ensure clinicians are delivering consistent and equitable care for patients, while new evidence and data emerge. A consistent and standardized approach to data collection and outcome measures is essential to ensure future research captures the impact and value of SLT input with individuals with Long COVID. What are the clinical implications of this work? The complexities and multifactorial SLT needs of individual with Long COVID call for appropriate SLT staffing provision, skill and training to fulfil the needs of this population. Speech and language therapists should be integrated with multidisciplinary Long COVID services to provide holistic care for patients and to support the professionals working with individuals with post-COVID voice, swallowing, communication and upper airway symptoms. (© 2023 The Authors. International Journal of Language & Communication Disorders published by John Wiley & Sons Ltd on behalf of Royal College of Speech and Language Therapists.)

Access or request full text: <https://libkey.io/10.1111/1460-6984.12868>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36916685&custid=ns023446>

10. Non-Pharmacological Therapies for Post-Viral Syndromes, Including Long COVID: A Systematic Review

Item Type: Journal Article

Authors: Chandan, Joht Singh;Brown, Kirsty R.;Simms-Williams, Nikita;Bashir, Nasir Z.;Camaradou, Jenny;Heining, Dominic;Turner, Grace M.;Rivera, Samantha Cruz;Hotham, Richard;Minhas, Sonica;Nirantharakumar, Krishnarajah;Sivan, Manoj;Khunti, Kamlesh;Raindi, Devan;Marwaha, Steven;Hughes, Sarah E.;McMullan, Christel;Marshall, Tom;Calvert, Melanie J.;Haroon, Shamil, et al

Publication Date: 2023

Journal: International Journal of Environmental Research and Public Health 20(4)

Abstract: Background: Post-viral syndromes (PVS), including Long COVID, are symptoms sustained from weeks to

years following an acute viral infection. Non-pharmacological treatments for these symptoms are poorly understood. This review summarises the evidence for the effectiveness of non-pharmacological treatments for PVS.; Methods: We conducted a systematic review to evaluate the effectiveness of non-pharmacological interventions for PVS, as compared to either standard care, alternative non-pharmacological therapy, or placebo. The outcomes of interest were changes in symptoms, exercise capacity, quality of life (including mental health and wellbeing), and work capability. We searched five databases (Embase, MEDLINE, PsycINFO, CINAHL, MedRxiv) for randomised controlled trials (RCTs) published between 1 January 2001 to 29 October 2021. The relevant outcome data were extracted, the study quality was appraised using the Cochrane risk-of-bias tool, and the findings were synthesised narratively.; Findings: Overall, five studies of five different interventions (Pilates, music therapy, telerehabilitation, resistance exercise, neuromodulation) met the inclusion criteria. Aside from music-based intervention, all other selected interventions demonstrated some support in the management of PVS in some patients.; Interpretation: In this study, we observed a lack of robust evidence evaluating the non-pharmacological treatments for PVS, including Long COVID. Considering the prevalence of prolonged symptoms following acute viral infections, there is an urgent need for clinical trials evaluating the effectiveness and cost-effectiveness of non-pharmacological treatments for patients with PVS.; Registration: The study protocol was registered with PROSPERO CRD42021282074] in October 2021 and published in BMJ Open in 2022.

Access or request full text: <https://libkey.io/10.3390/ijerph20043477>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36834176&custid=ns023446>

11. Long COVID: Clinical Framing, Biomarkers, and Therapeutic Approaches

Item Type: Journal Article

Authors: Conti, Valeria;Corbi, Graziamaria;Sabbatino, Francesco;De Pascale, Domenico;Sellitto, Carmine;Stefanelli, Berenice;Bertini, Nicola;De Simone, Matteo;Liguori, Luigi;Di Paola, Ilenia;De Bernardo, Maddalena;Tesse, Angela;Rosa, Nicola;Pagliano, Pasquale and Filippelli, Amelia

Publication Date: 2023

Journal: Journal of Personalized Medicine 13(2)

Abstract: More than two years after the onset of the COVID-19 pandemic, healthcare providers are facing an emergency within an emergency, the so-called long COVID or post-COVID-19 syndrome (PCS). Patients diagnosed with PCS develop an extended range of persistent symptoms and/or complications from COVID-19. The risk factors and clinical manifestations are many and various. Advanced age, sex/gender, and pre-existing conditions certainly influence the pathogenesis and course of this syndrome. However, the absence of precise diagnostic and prognostic biomarkers may further complicate the clinical management of patients. This review aimed to summarize recent evidence on the factors influencing PCS, possible biomarkers, and therapeutic approaches. Older patients recovered approximately one month earlier than younger patients, with higher rates of symptoms. Fatigue during the acute phase of COVID-19 appears to be an important risk factor for symptom persistence. Female sex, older age, and active smoking are associated with a higher risk of developing PCS. The incidence of cognitive decline and the risk of death are higher in PCS patients than in controls. Complementary and alternative medicine appears to be associated with improvement in symptoms, particularly fatigue. The heterogeneous nature of post-COVID symptoms and the complexity of patients with PCS, who are often polytreated due to concomitant clinical conditions, suggest a holistic and integrated approach to provide useful guidance for the treatment and overall management of long COVID.

Access or request full text: <https://libkey.io/10.3390/jpm13020334>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36836568&custid=ns023446>

12. Rational Use of Monoclonal Antibodies as Therapeutic Treatment in an Oncologic Patient with Long COVID

Item Type: Journal Article

Authors: Cusi, Maria Grazia;Di Giacomo, Anna Maria;Anichini, Gabriele;Gori Savellini, Gianni;Terrosi, Chiara;Gandolfo, Claudia and Maio, Michele

Publication Date: 2023

Journal: Viruses 15(3)

Abstract: We present the case of a 76-year-old male patient persistently infected by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in the setting of a stage IIIC cutaneous melanoma and non-Hodgkin's lymphoma (NHL). Due to the persistent coronavirus disease 19 (COVID-19), all cancer treatments were discontinued. Because of the worsening of his clinical state and the persistence of SARS-CoV-2 positivity for more than six months, the patient was treated with sotrovimab, which was ineffective due to resistance mutations acquired during that time. In order to resume cancer treatment and make the patient free from SARS-CoV-2, an in vitro screening of Evusheld monoclonal antibodies (tixagevumab-cilgavimab) against the viral strains isolated from the subject was performed. The promising results obtained during in vitro testing led to the authorization of the off-label use of Evusheld, which made the patient negative for SARS-CoV-2, thus, allowing him to resume his cancer treatment. This study highlights the Evusheld monoclonal antibodies' efficacy, not only in prevention but also in successful therapy against prolonged COVID-19. Therefore, testing neutralizing monoclonal antibodies in vitro against SARS-CoV-2 mutants directly isolated from patients could provide useful information for the treatment of people affected by long COVID.

Access or request full text: <https://libkey.io/10.3390/v15030614>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36992322&custid=ns023446>

13. Regulatory T Cells (Tregs) and COVID-19: Unveiling the Mechanisms, and Therapeutic Potentialities with a Special Focus on Long COVID

Item Type: Journal Article

Authors: Dhawan, Manish;Rabaan, Ali A.;Alwarthan, Sara;Alhajri, Mashael;Halwani, Muhammad A.;Alshengeti, Amer;Najim, Mustafa A.;Alwashmi, Ameen S. S.;Alshehri, Ahmad A.;Alshamrani, Saleh A.;AlShehail, Bashayer M.;Garout, Mohammed;Al-Abdulhadi, Saleh;Al-Ahmed, Shamsah;Thakur, Nanamika and Verma, Geetika

Publication Date: 2023

Journal: Vaccines 11(3)

Abstract: The COVID-19 pandemic has caused havoc all around the world. The causative agent of COVID-19 is the novel form of the coronavirus (CoV) named SARS-CoV-2, which results in immune system disruption, increased inflammation, and acute respiratory distress syndrome (ARDS). T cells have been important components of the immune system, which decide the fate of the COVID-19 disease. Recent studies have reported an important subset of T cells known as regulatory T cells (Tregs), which possess immunosuppressive and immunoregulatory properties and play a crucial role in the prognosis of COVID-19 disease. Recent studies have shown that COVID-19 patients have considerably fewer Tregs than the general population. Such a decrement may have an impact on COVID-19 patients in a number of ways, including diminishing the effect of inflammatory inhibition, creating an inequality in the Treg/Th17 percentage, and raising the chance of respiratory failure. Having fewer Tregs may enhance the likelihood of long COVID development in addition to contributing to the disease's poor prognosis. Additionally, tissue-resident Tregs provide tissue repair in addition to immunosuppressive and immunoregulatory activities, which may aid in the

recovery of COVID-19 patients. The severity of the illness is also linked to abnormalities in the Tregs' phenotype, such as reduced expression of FoxP3 and other immunosuppressive cytokines, including IL-10 and TGF-beta. Hence, in this review, we summarize the immunosuppressive mechanisms and their possible roles in the prognosis of COVID-19 disease. Furthermore, the perturbations in Tregs have been associated with disease severity. The roles of Tregs are also explained in the long COVID. This review also discusses the potential therapeutic roles of Tregs in the management of patients with COVID-19.

Access or request full text: <https://libkey.io/10.3390/vaccines11030699>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36992283&custid=ns023446>

14. Targeting Neuroinflammation to Alleviate Chronic Olfactory Dysfunction in Long COVID: A Role for Investigating Disease-Modifying Therapy (DMT)?

Item Type: Journal Article

Authors: Di Stadio, Arianna;Bernitsas, Evanthia;La Mantia, Ignazio;Brenner, Michael J.;Ralli, Massimo;Vaira, Luigi Angelo;Colizza, Andrea;Cavaliere, Carlo;Laudani, Matteo;Frohman, Teresa C.;De Vincentiis, Marco;Frohman, Elliot M. and Altieri, Marta

Publication Date: 2023

Journal: Life (Basel, Switzerland) 13(1)

Abstract: Chronic olfactory dysfunction after SARS-CoV-2 infection occurs in approximately 10% of patients with COVID-19-induced anosmia, and it is a growing public health concern. A regimen of olfactory training and anti-neuroinflammatory therapy with co-ultramicrosized palmitoylethanolamide with luteolin (um-PEA-LUT) has shown promising results in clinical trials; however, approximately 15% of treated patients do not achieve full recovery of a normal olfactory threshold, and almost 5% have no recovery. Disease-modifying therapies (DMTs), which are used to treat autoimmune neuroinflammation in multiple sclerosis (MS), have not been studied for treating persistent inflammation in refractory post-COVID-19 smell disorder. This study evaluated COVID-19-related smell loss and MS-related smell loss, comparing the responses to different therapies. Forty patients with MS and 45 reporting post-COVID-19 olfactory disorders were included in the study. All patients underwent nasal endoscopy and were evaluated by using validated Sniffin' Sticks testing. The patients with long COVID were treated for three months with um-PEA-LUT plus olfactory training. The patients with MS were treated with DMTs. Olfactory functions before and after treatment were analyzed in both groups. At the experimental endpoint, 13 patients in the COVID-19 group treated with um-PEA-LUT had residual olfactory impairment versus 10 patients in the MS group treated with DMTs. The severity of the persistent olfactory loss was lower in the MS group, and the patients with MS treated with IFN-beta and glatiramer acetate had the preservation of olfactory function. These data provide a rationale for considering prospective trials investigating the efficacy of DMTs for post-COVID-19 olfactory disorders that are refractory to um-PEA-LUT with olfactory training. This study is the first to consider the role of DMT in treating refractory post-viral olfactory loss in patients with long COVID.

Access or request full text: <https://libkey.io/10.3390/life13010226>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36676175&custid=ns023446>

15. Psychophysiologic Symptom Relief Therapy (PSRT) for Post-acute Sequelae of COVID-19

Item Type: Journal Article

Authors: Donnino, Michael;Howard, Patricia;Mehta, Shivani;Silverman, Jeremy;Cabrera, Maria J.;Yamin, Jolin B.;Balaji, Lakshman;Berg, Katherine M.;Heydrick, Stanley;Edwards, Robert and Grossestreuer, Anne V.

Publication Date: 2023

Journal: Mayo Clinic Proceedings.Innovations, Quality & Outcomes

Abstract: Objective: To determine if psychophysiological symptom relief therapy (PSRT) will reduce symptom burden in patients suffering from post-acute sequelae of COVID-19 (PASC) who had mild/moderate acute COVID-19 disease without objective evidence of organ injury.; Patients and Methods: Twenty-three adults under the age of 60 with PASC for at least 12 weeks following COVID-19 infection were enrolled in an interventional cohort study conducted via virtual platform between May 18, 2021 and August 7, 2022. Participants received PSRT during a 13 week (approximately 44 hour) course. Participants were administered validated questionnaires at baseline and at 4, 8, and 13 weeks. The primary outcome was change in somatic symptoms from baseline, measured using the Somatic Symptom Scale-8 (SSS-8), at 13 weeks.; Results: The median duration of symptoms prior to joining the study was 267 days (IQR: 144, 460). The mean SSS-8 score of the cohort decreased from baseline by 8.5 (95% CI: 5.7-11.4), 9.4 (95% CI: 6.9-11.9), and 10.9 (95% CI: 8.3-13.5) at 4, 8, and 13 weeks respectively (all $p < .001$). Participants also experienced statistically significant improvements across other secondary outcomes including changes in dyspnea, fatigue, and pain (all $p < .001$).; Conclusion: PSRT may effectively decrease symptom burden in patients suffering from PASC without evidence of organ injury. The study was registered on clinicaltrials.gov (NCT04854772). (© 2023 Published by Elsevier Inc on behalf of Mayo Foundation for Medical Education and Research.)

Access or request full text: <https://libkey.io/10.1016/j.mayocpiqo.2023.05.002>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37361483&custid=ns023446>

16. Psychological consequences of long COVID: comparing trajectories of depressive and anxiety symptoms before and after contracting SARS-CoV-2 between matched long- and short-COVID groups

Item Type: Journal Article

Authors: Fancourt, Daisy;Stephoe, Andrew and Bu, Feifei

Publication Date: 2023

Journal: The British Journal of Psychiatry : The Journal of Mental Science 222(2), pp. 74-81

Abstract: Background: There is a growing global awareness of the psychological consequences of long COVID, supported by emerging empirical evidence. However, the emergence and long-term trajectories of psychological symptoms following the infection are still unclear.; Aims: To examine when psychological symptoms first emerge following infection with SARS-CoV-2 and the long-term trajectories of psychological symptoms comparing long- and short-COVID groups.; Method: We analysed longitudinal data from the UCL COVID-19 Social Study (March 2020 to November 2021). We included data from adults living in England who reported contracting SARS-CoV-2 by November 2021 ($n = 3115$). Of these, 15.9% reported having had long COVID ($n = 495$). They were matched to participants who had short COVID using propensity score matching on a variety of demographic, socioeconomic and health covariates ($n = 962$ individuals with 13 325 observations) and data were further analysed using growth curve modelling.; Results: Depressive and anxiety symptoms increased immediately following the onset of infection in both long- and short-COVID groups. But the long-COVID group had substantially greater initial increases in depressive symptoms and heightened levels over 22 months follow-up. Initial increases in anxiety were not significantly different between groups, but only the short-COVID group experienced an improvement in anxiety over follow-up, leading to widening differences between groups.; Conclusions: The findings support work on the psychobiological pathways involved in the development of psychological symptoms relating to long COVID. The results highlight the need for monitoring of

mental health and provision of adequate support to be interwoven with diagnosis and treatment of the physical consequences of long COVID.

Access or request full text: <https://libkey.io/10.1192/bjp.2022.155>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36458509&custid=ns023446>

17. 'I am just a shadow of who I used to be'-Exploring existential loss of identity among people living with chronic conditions of Long COVID

Item Type: Journal Article

Authors: Fang, Chao;Baz, Sarah Akhtar;Sheard, Laura and Carpentieri, J. D.

Publication Date: 2023

Journal: Sociology of Health & Illness

Abstract: Identity loss and (re)construction forms a central debate in sociology of chronic illness. Living with chronic/persistent health conditions may raise questions about how disruptions can touch upon and further threaten the very roots of existence, by which people reflexively perceive a coherent and stable sense of 'being-in-the-world'. Whilst medical sociologists have shown interest in 'existential loss' in chronic illness, this question remains largely underexplored. Adopting a qualitative study on Long COVID (LC) as an example, this article illuminates existential identity loss as a deeply painful experience of losing body as a fundamental medium to retain continuity and consistency of one's narratively constructed identity. Interviews with 80 LC sufferers in the UK revealed that living with persistent and often uncertain symptoms and disruptions can cause the loss of biographical resources and resilience, making it difficult to reflexively understand their own being within the world. Their dynamic responses to LC also highlighted how sufferers' longing for a narratively coherent self can profoundly shape the ongoing construction of their identity in chronic health conditions. These insights into the complicated and often hard-to-express existential pain of identity loss can also nurture more holistic understandings of and support for LC and chronic illness more broadly. (© 2023 The Authors. Sociology of Health & Illness published by John Wiley & Sons Ltd on behalf of Foundation for the Sociology of Health & Illness.)

Access or request full text: <https://libkey.io/10.1111/1467-9566.13690>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37391994&custid=ns023446>

18. The therapeutic validation of long COVID

Item Type: Journal Article

Authors: Faust, Jeremy Samuel

Publication Date: 2023

Journal: The Lancet.Infectious Diseases

Abstract: Competing Interests: I declare no competing interests.

Access or request full text: [https://libkey.io/10.1016/S1473-3099\(23\)00355-9](https://libkey.io/10.1016/S1473-3099(23)00355-9)

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37302405&custid=ns023446>

19. Long COVID and the cardiovascular system-elucidating causes and cellular mechanisms in order to develop targeted diagnostic and therapeutic strategies: a joint Scientific Statement of the ESC Working Groups on Cellular Biology of the Heart and Myocardial and Pericardial Diseases

Item Type: Journal Article

Authors: Gyöngyösi, Mariann;Alcaide, Pilar;Asselbergs, Folkert W.;Brundel, Bianca J. J. M.;Camici, Giovanni G.;Martins, Paula da Costa;Ferdinandy, Péter;Fontana, Marianna;Girao, Henrique;Gnecchi, Massimiliano;Gollmann-Tepeköylü, Can;Kleinbongard, Petra;Krieg, Thomas;Madonna, Rosalinda;Paillard, Melanie;Pantazis, Antonis;Perrino, Cinzia;Pesce, Maurizio;Schiattarella, Gabriele G.;Sluijter, Joost P. G., et al

Publication Date: 2023

Journal: Cardiovascular Research 119(2), pp. 336-356

Abstract: Long COVID has become a world-wide, non-communicable epidemic, caused by long-lasting multiorgan symptoms that endure for weeks or months after SARS-CoV-2 infection has already subsided. This scientific document aims to provide insight into the possible causes and therapeutic options available for the cardiovascular manifestations of long COVID. In addition to chronic fatigue, which is a common symptom of long COVID, patients may present with chest pain, ECG abnormalities, postural orthostatic tachycardia, or newly developed supraventricular or ventricular arrhythmias. Imaging of the heart and vessels has provided evidence of chronic, post-infectious perimyocarditis with consequent left or right ventricular failure, arterial wall inflammation, or microthrombosis in certain patient populations. Better understanding of the underlying cellular and molecular mechanisms of long COVID will aid in the development of effective treatment strategies for its cardiovascular manifestations. A number of mechanisms have been proposed, including those involving direct effects on the myocardium, microthrombotic damage to vessels or endothelium, or persistent inflammation. Unfortunately, existing circulating biomarkers, coagulation, and inflammatory markers, are not highly predictive for either the presence or outcome of long COVID when measured 3 months after SARS-CoV-2 infection. Further studies are needed to understand underlying mechanisms, identify specific biomarkers, and guide future preventive strategies or treatments to address long COVID and its cardiovascular sequelae.; **Competing Interests:** Conflict of interest: F.W.A., P.A., B.J.J.M.B., S.M.D., M.F., M.G., S.V.L., R.M., C.P., M.P., G.G.S., S.S., C.G.-T., T.K.: no conflicts to disclose. G.G.C. is coinventors on the International Patent WO/2020/226993 filed in April 2020. The patent relates to the use of antibodies which specifically bind IL-1 α to reduce various sequelae of ischaemia-reperfusion injury to the central nervous system. G.G.C. is a consultant to Sovid solutions limited. P.F. is the founder and CEO of Pharmahungary Group, a group of R&D companies. C.T. has received speaker fees and/or contributions to congresses from Abbott, Abiomed, Astra Zeneca, Bayer, Böhringer-Ingelheim, Novartis, Pfizer, and Servier; all outside the submitted work. (© The Author(s) 2022. Published by Oxford University Press on behalf of the European Society of Cardiology.)

Access or request full text: <https://libkey.io/10.1093/cvr/cvac115>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=35875883&custid=ns023446>

20. High-dose coenzyme Q10 therapy versus placebo in patients with post COVID-19 condition: a randomized, phase 2, crossover trial

Item Type: Journal Article

Authors: Hansen, Kristoffer S.;Mogensen, Trine H.;Agergaard, Jane;Schiøttz-Christensen, Berit;Østergaard, Lars;Vibholm, Line K. and Leth, Steffen

Publication Date: 2023

Journal: The Lancet Regional Health.Europe 24, pp. 100539

Abstract: Background: Post COVID-19 condition (PCC) is defined as symptoms lasting more than 12 weeks after developing COVID-19. Evidence of mitochondrial dysfunction has been reported in peripheral blood mononuclear cells obtained from patients with COVID-19. We hypothesized that PCC is caused by prolonged mitochondrial dysfunction. Given that coenzyme Q10 (CoQ10) can improve mitochondrial function, we examined whether high-dose CoQ10 can reduce the number and/or severity of PCC-related symptoms.; Methods: In this placebo-controlled, double-blind, 2 × 2 crossover interventional trial, participants were recruited from two centres at Aarhus University Hospital and Gødstrup Hospital, Denmark. They were randomly assigned to receive either oral capsules of CoQ10 in a dose of 500 mg/day or placebo for 6 weeks, with crossover treatment after a 4-week washout period. The ED-5Q and a PCC-symptom specific questionnaire were completed by the participants at 5 visits during the 20-week study period. The primary endpoint was the change in the number and/or severity of PCC-related symptoms after the 6-week intervention compared to placebo. Participants who completed the two-dosing period were included in the primary analysis, while all participants receiving one dose were included in safety assessment.; Findings: From May 25th, 2021, to September 22nd, 2021, 121 participants underwent randomization, and 119 completed both dosing periods - 59 and 60 in group A and B, respectively. At baseline, the mean PCC-related symptom score was 43.06 (95% CI: 40.18; 45.94), and the mean EQ-5D health index was 0.66 (95% CI: 0.64; 0.68). The difference between CoQ10 and placebo was not significant with respect to either the change in EQ-5D health index (with a mean difference of 0.01; 95% CI: -0.02; 0.04; p = 0.45) or the change in PCC-related symptom score (with a mean difference of -1.18; 95% CI: -3.54; 1.17; p = 0.32).; Interpretation: Based on self-reported data, CoQ10 treatment does not appear to significantly reduce the number or severity of PCC-related symptoms when compared to placebo. However, we observed a significant spontaneous improvement on both scores regardless of treatment during 20 weeks observation.; Funding: Placebo and CoQ10 capsules were provided by Pharma Nord, and the trial was supported by grants from the Novo Nordisk Foundation (NNF21OC0066984). This trial is registered with EudraCT, 2020-005961-16 and ClinicalTrials.gov, NCT04960215. The trial is completed.; Competing Interests: We declare no competing interests. (© 2022 The Author(s).)

Access or request full text: <https://libkey.io/10.1016/j.lanepe.2022.100539>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36337437&custid=ns023446>

21. Detrimental effects of COVID-19 in the brain and therapeutic options for long COVID: The role of Epstein-Barr virus and the gut-brain axis

Item Type: Journal Article

Authors: Hashimoto, Kenji

Publication Date: 2023

Journal: Molecular Psychiatry

Abstract: The coronavirus disease 2019 (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection has resulted in a serious public health burden worldwide. In addition to respiratory, heart, and gastrointestinal symptoms, patients infected with SARS-CoV-2 experience a number of

persistent neurological and psychiatric symptoms, known as long COVID or "brain fog". Studies of autopsy samples from patients who died from COVID-19 detected SARS-CoV-2 in the brain. Furthermore, increasing evidence shows that Epstein-Barr virus (EBV) reactivation after SARS-CoV-2 infection might play a role in long COVID symptoms. Moreover, alterations in the microbiome after SARS-CoV-2 infection might contribute to acute and long COVID symptoms. In this article, the author reviews the detrimental effects of COVID-19 on the brain, and the biological mechanisms (e.g., EBV reactivation, and changes in the gut, nasal, oral, or lung microbiomes) underlying long COVID. In addition, the author discusses potential therapeutic approaches based on the gut-brain axis, including plant-based diet, probiotics and prebiotics, fecal microbiota transplantation, and vagus nerve stimulation, and sigma-1 receptor agonist fluvoxamine. (© 2023. The Author(s).)

Access or request full text: <https://libkey.io/10.1038/s41380-023-02161-5>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37402856&custid=ns023446>

22. Natural history of long-COVID in a nationwide, population cohort study

Item Type: Journal Article

Authors: Hastie, Claire E.;Lowe, David J.;McAuley, Andrew;Mills, Nicholas L.;Winter, Andrew J.;Black, Corri;Scott, Janet T.;O'Donnell, Catherine A.;Blane, David N.;Browne, Susan;Ibbotson, Tracy R. and Pell, Jill P.

Publication Date: 2023

Journal: Nature Communications 14(1), pp. 1-10

Access or request full text: <https://libkey.io/10.1038/s41467-023-39193-y>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=EPTOC164276102&custid=ns023446>

23. Living with "long COVID": A systematic review and meta-synthesis of qualitative evidence

Item Type: Journal Article

Authors: Hossain, M. M.;Das, Jyoti;Rahman, Farzana;Nesa, Fazilatun;Hossain, Puspita;Islam, A. M. K.;Tasnim, Samia;Faizah, Farah;Mazumder, Hoimonty;Purohit, Neetu and Ramirez, Gilbert

Publication Date: 2023

Journal: PloS One 18(2), pp. e0281884

Abstract: Objectives: Long-term health consequences of coronavirus disease (COVID-19), also known as "long COVID," has become a global health concern. In this systematic review, we aimed to synthesize the qualitative evidence on lived experiences of people living with long COVID that may inform health policymaking and practice.; Methods: We searched six major databases and additional sources and systematically retrieved relevant qualitative studies and conducted a meta-synthesis of key findings using the Joanna Briggs Institute (JBI) guidelines and reporting standards of the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist.; Results: We found 15 articles representing 12 studies out of 619 citations from different sources. These studies provided 133 findings that were categorized into 55 categories. All categories were aggregated to the following synthesized findings: living with complex physical health problems, psychosocial crises of long COVID, slow recovery and rehabilitation, digital resources and information management, changes in social support, and experiences with healthcare providers, services, and systems. Ten studies were from the UK, and others were from Denmark and Italy,

which highlights a critical lack of evidence from other countries.; Conclusions: More representative research is needed to understand long COVID-related experiences from diverse communities and populations. The available evidence informs a high burden of biopsychosocial challenges among people with long COVID that would require multilevel interventions such as strengthening health and social policies and services, engaging patients and caregivers in making decisions and developing resources, and addressing health and socioeconomic disparities associated with long COVID through evidence-based practice.; Competing Interests: The authors have declared that no competing interests exist. (Copyright: This is an open access article, free of all copyright, and may be freely reproduced, distributed, transmitted, modified, built upon, or otherwise used by anyone for any lawful purpose. The work is made available under the Creative Commons CC0 public domain dedication.)

Access or request full text: <https://libkey.io/10.1371/journal.pone.0281884>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36795701&custid=ns023446>

24. Repurposing exercise training and pharmacological therapies to address the post-acute sequelae of COVID-19 (PASC) in diabetes mellitus

Item Type: Journal Article

Authors: Jie Chee, Ying and Dalan, Rinkoo

Publication Date: 2023

Journal: Diabetes Research and Clinical Practice 199, pp. 110651

Abstract: Competing Interests: Declaration of Competing Interest The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Access or request full text: <https://libkey.io/10.1016/j.diabres.2023.110651>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37015258&custid=ns023446>

25. Long COVID: Clinical characteristics, proposed pathogenesis and potential therapeutic targets

Item Type: Journal Article

Authors: Kenny, Grace;Townsend, Liam;Savinelli, Stefano and Mallon, Patrick W. G.

Publication Date: 2023

Journal: Frontiers in Molecular Biosciences 10, pp. 1157651

Abstract: The emergence of persistent ill-health in the aftermath of SARS-CoV-2 infection has presented significant challenges to patients, healthcare workers and researchers. Termed long COVID, or post-acute sequelae of COVID-19 (PASC), the symptoms of this condition are highly variable and span multiple body systems. The underlying pathophysiology remains poorly understood, with no therapeutic agents proven to be effective. This narrative review describes predominant clinical features and phenotypes of long COVID alongside the data supporting potential pathogenesis of these phenotypes including ongoing immune dysregulation, viral persistence, endotheliopathy, gastrointestinal microbiome disturbance, autoimmunity, and dysautonomia. Finally, we describe current potential

therapies under investigation, as well as future potential therapeutic options based on the proposed pathogenesis research.; Competing Interests: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. (Copyright © 2023 Kenny, Townsend, Savinelli and Mallon.)

Access or request full text: <https://libkey.io/10.3389/fmolb.2023.1157651>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37179568&custid=ns023446>

26. Hyperbaric oxygen therapy for long COVID (HOT-LoCO), an interim safety report from a randomised controlled trial

Item Type: Journal Article

Authors: Kjellberg, Anders;Hassler, Adrian;Boström, Emil;El Gharbi, Sara;Al-Ezerjawi, Sarah;Kowalski, Jan;Rodriguez-Wallberg, Kenny;Bruchfeld, Judith;Ståhlberg, Marcus;Nygren-Bonnier, Malin;Runold, Michael and Lindholm, Peter

Publication Date: 2023

Journal: BMC Infectious Diseases 23(1), pp. 33

Abstract: Background: With ~ 50 million individuals suffering from post-COVID condition (PCC), low health related quality of life (HRQoL) is a vast problem. Common symptoms of PCC, that persists 3 months from the onset of COVID-19 are fatigue, shortness of breath and cognitive dysfunction. No effective treatment options have been widely adopted in clinical practice. Hyperbaric oxygen (HBO 2) is a candidate drug.; Methods: The objective of this interim analysis is to describe our cohort and evaluate the safety of HBO 2 for post covid condition. In an ongoing randomised, placebo-controlled, double blind, clinical trial, 20 previously healthy subjects with PCC were assigned to HBO 2 or placebo. Primary endpoints are physical domains in RAND-36; Physical functioning (PF) and Role Physical (RP) at 13 weeks. Secondary endpoints include objective physical tests. Safety endpoints are occurrence, frequency, and seriousness of Adverse Events (AEs). An independent data safety monitoring board (DSMB) reviewed unblinded data. The trial complies with Good Clinical Practice. Safety endpoints are evaluated descriptively. Comparisons against norm data was done using t-test.; Results: Twenty subjects were randomised, they had very low HRQoL compared to norm data. Mean (SD) PF 31.75 (19.55) (95% Confidence interval; 22.60-40.90) vs 83.5 (23.9) $p < 0.001$ in Rand-36 PF and mean 0.00 (0.00) in RP. Very low physical performance compared to norm data. 6MWT 442 (180) (95% CI 358-525) vs 662 (18) meters $p < 0.001$. 31 AEs occurred in 60% of subjects. In 20 AEs, there were at least a possible relationship with the study drug, most commonly cough and chest pain/discomfort.; Conclusions: An (unexpectedly) high frequency of AEs was observed but the DSMB assessed HBO 2 to have a favourable safety profile. Our data may help other researchers in designing trials. Trial Registration ClinicalTrials.gov: NCT04842448. Registered 13 April 2021, <https://clinicaltrials.gov/ct2/show/NCT04842448> . EudraCT: 2021-000764-30. Registered 21 May 2021, <https://www.clinicaltrialsregister.eu/ctr-search/trial/2021-000764-30/SE>. (© 2023. The Author(s).)

Access or request full text: <https://libkey.io/10.1186/s12879-023-08002-8>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36670365&custid=ns023446>

27. Patients' Experiences With Therapeutic Approaches for Post-COVID Syndrome: Results of a Crowdsourced Research Survey

Item Type: Journal Article

Authors: Klocke, Carina;Valentini, Jan;Stolz, Regina;Gaßner, Lena;Joos, Stefanie and Förster, Christian

Publication Date: 2023

Journal: Annals of Family Medicine 21(1), pp. 73-75

Abstract: Some patients develop multiple protracted sequelae after infection with SARS-CoV-2, collectively known as post-COVID syndrome or long COVID. To date, there is no evidence showing benefit of specific therapies for this condition, and patients likely resort to self-initiated therapies. We aimed to obtain information about therapies used by and needs of this population via inductive crowdsourcing research. Patients completed an online questionnaire about their symptoms and experiences with therapeutic approaches. Responses of 499 participants suggested few approaches (eg, mind-body medicine, respiratory therapy) had positive effects and showed a great need for patient-centered communication (eg, more recognition of this syndrome). Our findings can help design clinical studies and underscore the importance of the holistic approach to care provided by family medicine. (© 2023 Annals of Family Medicine, Inc.)

Access or request full text: <https://libkey.io/10.1370/afm.2898>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36690496&custid=ns023446>

28. Long-term post-acute sequelae of COVID-19 infection: a retrospective, multi-database cohort study in Hong Kong and the UK

Item Type: Journal Article

Authors: Lam, Ivan Chun Hang;Wong, Carlos King Ho;Zhang, Ran;Chui, Celine Sze Ling;Lai, Francisco Tsz Tsun;Li, Xue;Chan, Esther Wai Yin;Luo, Hao;Zhang, Qingpeng;Man, Kenneth Keng Cheung;Cheung, Bernard Man Yung;Tang, Sydney Chi Wai;Lau, Chak Sing;Wan, Eric Yuk Fai and Wong, Ian Chi Kei

Publication Date: 2023

Journal: EclinicalMedicine 60, pp. 102000

Abstract: Background: Evidence on post-acute sequelae of SARS-CoV-2 (PASC) has shown inconsistent findings. This study aimed to generate coherent evidence on the post-acute sequelae of COVID-19 infection using electronic healthcare records across two regions.; Methods: In this retrospective, multi-database cohort study, patients with COVID-19 aged 18 or above between April 1st 2020 and May 31st 2022 from the Hong Kong Hospital Authority (HKHA) and March 16th 2020 and May 31st 2021 from the UK Biobank (UKB) databases and their matched controls were followed for up to 28 and 17 months, respectively. Covariates between patients with COVID-19 and non-COVID-19 controls were adjusted using propensity score-based inverse probability treatment weighting. Cox proportional regression was used to estimate the hazard ratio (HR) of clinical sequelae, cardiovascular, and all-cause mortality 21 days after COVID-19 infection.; Findings: A total of 535,186 and 16,400 patients were diagnosed with COVID-19 from HKHA and UKB, of whom 253,872 (47.4%) and 7613 (46.4%) were male, with a mean age (\pm SD) of 53.6 (17.8) years and 65.0 (8.5) years, respectively. Patients with COVID-19 incurred greater risk of heart failure (HR 1.82; 95% CI 1.65, 2.01), atrial fibrillation (1.31; 1.16, 1.48), coronary artery disease (1.32; 1.07, 1.63), deep vein thrombosis (1.74; 1.27, 2.37), chronic pulmonary disease (1.61; 1.40, 1.85), acute respiratory distress syndrome (1.89; 1.04, 3.43), interstitial lung disease (3.91; 2.36, 6.50), seizure (2.32; 1.12, 4.79), anxiety disorder (1.65; 1.29, 2.09), post-traumatic stress disorder (1.52; 1.23, 1.87), end-stage renal disease (1.76; 1.31, 2.38), acute kidney injury (2.14; 1.69, 2.71), pancreatitis (1.42; 1.10, 1.83), cardiovascular (2.86; 1.25, 6.51) and all-cause mortality (4.16; 2.11, 8.21) mortality during their post-acute phase of infection.; Interpretation: The consistent greater risk of PASC highlighted the need for sustained multi-disciplinary care for COVID-19 survivors.; Funding: Health Bureau, The Government of the Hong Kong Special Administrative Region, Collaborative Research Fund, The Government of the Hong Kong Special

Administrative Region and AIR@InnoHK, administered by the Innovation and Technology Commission, The Government of the Hong Kong Special Administrative Region.; Competing Interests: CKHW reports receipt of research funding from the EuroQoL Group Research Foundation, the Hong Kong Research Grants Council, and the Hong Kong Health and Medical Research Fund; CSLC has received grants from the Health Bureau of the Hong Kong Government, Hong Kong Research Grant Council, Hong Kong Innovation and Technology Commission, Pfizer, IQVIA, MSD, and Amgen, personal fee from Primevigilance Ltd., outside the submitted work; FTTL has been supported by the RGC Postdoctoral Fellowship under the Hong Kong Research Grants Council; XL has received research grants from the Health Bureau of the Government of the Hong Kong SAR, research and educational grants from Janssen and Pfizer, internal funding from University of Hong Kong, consultancy fee from Merck Sharp & Dohme, speaker fee from Pfizer, unrelated to this work; KKCM reports grants from the CW Maplethorpe Fellowship, National Institute of Health Research, UK, Hong Kong Research Grant Council and the European Commission Horizon 2020 Framework, personal fees from IQVIA, and grants from Amgen and GlaxoSmithKline, outside this work. EWYC has received grants from Research Grants Council of the Hong Kong SAR, Research Fund Secretariat of the Health Bureau of the Hong Kong SAR, National Natural Science Fund of China, Bayer, Bristol-Myers Squibb, Pfizer, Janssen, Novartis, Amgen, AstraZeneca, Takeda, the RGA Reinsurance Company, Narcotics Division of the Security Bureau of the Hong Kong SAR, and the National Health and Medical Research Council Australia; consulting fees from AstraZeneca, Pfizer and Novartis; and honorarium from the Hospital Authority of the Hong Kong SAR and serve as the president of the International Society for Pharmacoeconomics and Outcomes Research (ISPOR), Hong Kong Regional Chapter, outside the submitted work.; BMYC reports research funding outside the submitted work from Guangdong-Hong Kong Technology Cooperation Funding Scheme; SCWT reports research funding outside the submitted work from the Hong Kong RGC, and the Hong Kong Health and Medical Research Fund, and National Natural Science Fund of China; ICKW reports research funding from Amgen, Bristol Myers Squibb, Pfizer, Janssen, Bayer, GSK, Novartis, the Hong Kong Research Grants Council, the Hong Kong Health and Medical Research Fund, the National Institute for Health Research in England, the European Commission, and the National Health and Medical Research Council in Australia, outside the submitted work; and is a non-executive director of Jacobson Medical in Hong Kong and a consultant to IQVIA and World Health Organization; and serve as a member of the Pharmacy and Poisons Board, Hong Kong SAR, Expert Committee on Clinical Events Assessment Following COVID-19 Immunization and Advisory Panel on COVID-19 Vaccines of the Hong Kong Government; EYFW received research grants from the Health Bureau of the Government of the Hong Kong SAR, and the Hong Kong Research Grants Council, outside the submitted work. All other authors report no disclosures relevant to the manuscript. (© 2023 The Author(s).)

Access or request full text: <https://libkey.io/10.1016/j.eclinm.2023.102000>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37197226&custid=ns023446>

29. Long COVID: 3 years in

Item Type: Journal Article

Authors: Lancet, The

Publication Date: 2023

Journal: Lancet (London, England) 401(10379), pp. 795

Access or request full text: [https://libkey.io/10.1016/S0140-6736\(23\)00493-2](https://libkey.io/10.1016/S0140-6736(23)00493-2)

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36906338&custid=ns023446>

30. How Primary Care Physicians Can Recognize and Treat Long COVID

Item Type: Journal Article

Authors: Landhuis, Esther Wei-Yun

Publication Date: 2023

Journal: Jama 329(20), pp. 1727-1729

Access or request full text: <https://libkey.io/10.1001/jama.2023.6604>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37133827&custid=ns023446>

31. Long-COVID in Patients with Cancer Previously Treated with Early Anti-SARS-CoV-2 Therapies in an Out-of-Hospital Setting: A Single-Center Experience

Item Type: Journal Article

Authors: Lasagna, Angioletta;Albi, Giuseppe;Figini, Simone;Basile, Sara;Sacchi, Paolo;Bruno, Raffaele and Pedrazzoli, Paolo

Publication Date: 2023

Journal: Cancers 15(4)

Abstract: The incidence of long COVID in a cohort of patients with cancer with or without previous treatment with early therapies anti-SARS-CoV-2 in an out-of-hospital setting have to be elucidated. We prospectively enrolled all patients treated for a solid tumor at the department of Medical Oncology of the Fondazione IRCCS Policlinico San Matteo with a positive SARS-CoV-2 antigen or polymerase chain reaction test from January to September 2022 (Omicron surge). Ninety-seven patients answered the survey questions by telephone at least 12 weeks after COVID-19 diagnosis in order to evaluate the incidence of long COVID symptoms. Only twelve patients (12.4%) reported long COVID. No significant difference between early therapies anti-SARS-CoV-2 31 and long COVID ($p = 0.443$) was seen. The female sex ($p = 0.024$) and diabetes mellitus ($p = 0.014$) are significantly associated with long COVID. No statistically significant difference between the two groups (Long COVID vs. No Long COVID) according to the time to nasal swab viral clearance ($p = 0.078$). The overlap between the symptoms related to the oncological disease/oncological treatment and the symptoms of long COVID is one of the main future challenges that oncologists will have to manage.

Access or request full text: <https://libkey.io/10.3390/cancers15041269>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36831611&custid=ns023446>

32. Pathogenesis Underlying Neurological Manifestations of Long COVID Syndrome and Potential Therapeutics

Item Type: Journal Article

Authors: Leng, Albert;Shah, Manuj;Ahmad, Syed Ameen;Premraj, Laviensraj;Wildi, Karin;Li Bassi, Gianluigi;Pardo, Carlos A.;Choi, Alex and Cho, Sung-Min

Publication Date: 2023

Journal: Cells 12(5)

Abstract: The development of long-term symptoms of coronavirus disease 2019 (COVID-19) more than four weeks after primary infection, termed "long COVID" or post-acute sequela of COVID-19 (PASC), can implicate persistent neurological complications in up to one third of patients and present as fatigue, "brain fog", headaches, cognitive impairment, dysautonomia, neuropsychiatric symptoms, anosmia, hypogeusia, and peripheral neuropathy. Pathogenic mechanisms of these symptoms of long COVID remain largely unclear; however, several hypotheses implicate both nervous system and systemic pathogenic mechanisms such as SARS-CoV2 viral persistence and neuroinvasion, abnormal immunological response, autoimmunity, coagulopathies, and endotheliopathy. Outside of the CNS, SARS-CoV-2 can invade the support and stem cells of the olfactory epithelium leading to persistent alterations to olfactory function. SARS-CoV-2 infection may induce abnormalities in innate and adaptive immunity including monocyte expansion, T-cell exhaustion, and prolonged cytokine release, which may cause neuroinflammatory responses and microglia activation, white matter abnormalities, and microvascular changes. Additionally, microvascular clot formation can occlude capillaries and endotheliopathy, due to SARS-CoV-2 protease activity and complement activation, can contribute to hypoxic neuronal injury and blood-brain barrier dysfunction, respectively. Current therapeutics target pathological mechanisms by employing antivirals, decreasing inflammation, and promoting olfactory epithelium regeneration. Thus, from laboratory evidence and clinical trials in the literature, we sought to synthesize the pathophysiological pathways underlying neurological symptoms of long COVID and potential therapeutics.

Access or request full text: <https://libkey.io/10.3390/cells12050816>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36899952&custid=ns023446>

33. Long COVID: clues about causes

Item Type: Journal Article

Authors: Liew, Felicity;Efstathiou, Claudia and Openshaw, Peter J. M.

Publication Date: 2023

Journal: The European Respiratory Journal 61(5)

Abstract: Competing Interests: Conflicts of interest: P.J.M. Openshaw reports grants from the EU Innovative Medicines Initiative (IMI) 2 Joint Undertaking during the submitted work; grants from UK Medical Research Council, GlaxoSmithKline, Wellcome Trust, EU-IMI, UK, National Institute for Health Research, and UK Research and Innovation-Department for Business, Energy and Industrial Strategy, and personal fees from Pfizer, Nestle, Janssen and Seqirus, outside the submitted work. F. Liew, C. Efstathiou and P.J.M. Openshaw are members of the PHOSP-COVID consortia, a UK-wide study examining long-term health outcomes after hospitalisation with COVID-19.

Access or request full text: <https://libkey.io/10.1183/13993003.00409-2023>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36958743&custid=ns023446>

34. The therapeutic potential of non-invasive brain stimulation for the treatment of Long-COVID-related cognitive fatigue

Item Type: Journal Article

Authors: Linnhoff, Stefanie;Koehler, Lilli;Haghikia, Aiden and Zaehle, Tino

Publication Date: 2023

Journal: *Frontiers in Immunology* 13, pp. 935614

Abstract: Following an acute COVID-19 infection, a large number of patients experience persisting symptoms for more than four weeks, a condition now classified as Long-COVID syndrome. Interestingly, the likelihood and severity of Long-COVID symptoms do not appear to be related to the severity of the acute COVID-19 infection. Fatigue is amongst the most common and debilitating symptoms of Long-COVID. Other symptoms include dyspnoea, chest pain, olfactory disturbances, and brain fog. Fatigue is also frequently reported in many other neurological diseases, affecting a broad range of everyday activities. However, despite its clinical significance, limited progress has been made in understanding its causes and developing effective treatment options. Non-invasive brain stimulation (NIBS) methods offer the unique opportunity to modulate fatigue-related maladaptive neuronal activity. Recent data show promising results of NIBS applications over frontoparietal regions to reduce fatigue symptoms. In this current paper, we review recent data on Long-COVID and Long-COVID-related fatigue (LCOF), with a special focus on cognitive fatigue. We further present widely used NIBS methods, such as transcranial direct current stimulation, transcranial alternating current stimulation, and transcutaneous vagus nerve stimulation and propose their use as possible therapeutic strategies to alleviate individual pathomechanisms of LCOF. Since NIBS methods are safe and well-tolerated, they have the potential to enhance the quality of life in a broad group of patients.; **Competing Interests:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. (Copyright © 2023 Linnhoff, Koehler, Haghikia and Zaehle.)

Access or request full text: <https://libkey.io/10.3389/fimmu.2022.935614>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36700201&custid=ns023446>

35. Long covid outcomes at one year after mild SARS-CoV-2 infection: nationwide cohort study

Item Type: Journal Article

Authors: Mizrahi, Barak;Sudry, Tamar;Flaks-Manov, Natalie;Yehezkelli, Yoav;Kalkstein, Nir;Akiva, Pinchas;Ekka-Zohar, Anat;Ben David, Shirley Shapiro;Lerner, Uri;Bivas-Benita, Maytal and Greenfeld, Shira

Publication Date: 2023

Journal: *BMJ (Clinical Research Ed.)* 380, pp. e072529

Abstract: Objectives: To determine the clinical sequelae of long covid for a year after infection in patients with mild disease and to evaluate its association with age, sex, SARS-CoV-2 variants, and vaccination status.; **Design:** Retrospective nationwide cohort study.; **Setting:** Electronic medical records from an Israeli nationwide healthcare organisation.; **Population:** 1 913 234 Maccabi Healthcare Services members of all ages who did a polymerase chain reaction test for SARS-CoV-2 between 1 March 2020 and 1 October 2021.; **Main Outcome Measures:** Risk of an evidence based list of 70 reported long covid outcomes in unvaccinated patients infected with SARS-CoV-2 matched to uninfected people, adjusted for age and sex and stratified by SARS-CoV-2 variants, and risk in patients with a breakthrough SARS-CoV-2 infection compared with unvaccinated infected controls. Risks were compared using hazard ratios and risk differences per 10 000 patients measured during the early (30-180 days) and late (180-360 days) time periods after infection.; **Results:** Covid-19 infection was significantly associated with increased risks in early and late periods for anosmia and dysgeusia (hazard ratio 4.59 (95% confidence interval 3.63 to 5.80), risk difference 19.6 (95% confidence interval 16.9 to 22.4) in early period; 2.96 (2.29 to 3.82), 11.0 (8.5 to 13.6) in late period), cognitive impairment (1.85 (1.58 to 2.17), 12.8, (9.6 to 16.1); 1.69 (1.45 to 1.96), 13.3 (9.4 to 17.3)), dyspnoea (1.79 (1.68 to 1.90), 85.7 (76.9 to 94.5); 1.30 (1.22 to 1.38), 35.4 (26.3 to 44.6)), weakness (1.78 (1.69 to 1.88), 108.5, 98.4 to 118.6; 1.30 (1.22 to 1.37), 50.2 (39.4 to 61.1)), and palpitations (1.49 (1.35 to 1.64), 22.1 (16.8 to 27.4); 1.16 (1.05 to 1.27), 8.3 (2.4 to 14.1)) and with significant but lower excess risk for streptococcal tonsillitis and dizziness. Hair loss, chest pain, cough, myalgia, and respiratory disorders were significantly increased only during the

early phase. Male and female patients showed minor differences, and children had fewer outcomes than adults during the early phase of covid-19, which mostly resolved in the late period. Findings remained consistent across SARS-CoV-2 variants. Vaccinated patients with a breakthrough SARS-CoV-2 infection had a lower risk for dyspnoea and similar risk for other outcomes compared with unvaccinated infected patients.; Conclusions: This nationwide study suggests that patients with mild covid-19 are at risk for a small number of health outcomes, most of which are resolved within a year from diagnosis.; Competing Interests: Competing interests: All authors have completed the ICMJE uniform disclosure form at <https://www.icmje.org/disclosure-of-interest/> and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work. (© Author(s) (or their employer(s)) 2019. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.)

Access or request full text: <https://libkey.io/10.1136/bmj-2022-072529>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36631153&custid=ns023446>

36. Towards evidence-based and inclusive models of peer support for long covid: A hermeneutic systematic review

Item Type: Journal Article

Authors: Mullard, Jordan C. R.;Kawalek, Jessica;Parkin, Amy;Rayner, Clare;Mir, Ghazala;Sivan, Manoj and Greenhalgh, Trisha

Publication Date: 2023

Journal: Social Science & Medicine (1982) 320, pp. 115669

Abstract: Since the first wave of COVID-19 in March 2020 the number of people living with post-COVID syndrome has risen rapidly at global pace, however, questions still remain as to whether there is a hidden cohort of sufferers not accessing mainstream clinics. This group are likely to be constituted by already marginalised people at the sharp end of existing health inequalities and not accessing formal clinics. The challenge of supporting such patients includes the question of how best to organise and facilitate different forms of support. As such, we aim to examine whether peer support is a potential option for hidden or hardly reached populations of long COVID sufferers with a specific focus on the UK, though not exclusively. Through a systematic hermeneutic literature review of peer support in other conditions (57 papers), we evaluate the global potential of peer support for the ongoing needs of people living with long COVID. Through our analysis, we highlight three key peer support perspectives in healthcare reflecting particular theoretical perspectives, goals, and understandings of what is 'good health', we call these: biomedical (disease control/management), relational (intersubjective mutual support) and socio-political (advocacy, campaigning & social context). Additionally, we identify three broad models for delivering peer support: service-led, community-based and social media. Attention to power relations, social and cultural capital, and a co-design approach are key when developing peer support services for disadvantaged and underserved groups. Models from other long-term conditions suggest that peer support for long COVID can and should go beyond biomedical goals and harness the power of relational support and collective advocacy. This may be particularly important when seeking to reduce health inequalities and improve access for a potentially hidden cohort of sufferers.; Competing Interests: Declaration of competing interest TG is a member of Independent SAGE and NHS England long COVID national task force. All other authors declare that they have no conflicts of interest. (Copyright © 2023 The Authors. Published by Elsevier Ltd.. All rights reserved.)

Access or request full text: <https://libkey.io/10.1016/j.socscimed.2023.115669>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36708608&custid=ns0234>

37. A Potential Novel Treatment for Chronic Cough in Long COVID Patients: Clearance of Epipharyngeal Residual SARS-CoV-2 Spike RNA by Epipharyngeal Abrasive Therapy

Item Type: Journal Article

Authors: Nishi, Kensuke;Yoshimoto, Shohei;Tanaka, Takayuki;Kimura, Shoichi;Shinchi, Yudai and Yamano, Takafumi

Publication Date: 2023

Journal: Cureus 15(1), pp. e33421

Abstract: A major target of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the epipharyngeal mucosa. Epipharyngeal abrasive therapy (EAT) is a Japanese treatment for chronic epipharyngitis. EAT is a treatment for chronic epipharyngitis in Japan that involves applying zinc chloride as an anti-inflammatory agent to the epipharyngeal mucosa. Here, we present a case of a 21-year-old man with chronic coughing that persisted for four months after a diagnosis of mild coronavirus disease 2019 (COVID-19), who was treated by EAT. We diagnosed chronic epipharyngitis as the cause of the chronic cough after the SARS-CoV-2 infection. SARS-CoV-2 spike RNA had persisted in the epipharyngeal mucosa of this Long COVID patient. EAT was performed once a week for three months, which eliminated residual SARS-CoV-2 RNA and reduced epipharyngeal inflammation. Moreover, a reduction in the expression of proinflammatory cytokines was found by histopathological examination. We speculate that the virus was excreted with the drainage induced by EAT, which stopped the secretion of proinflammatory cytokines. This case study suggests that EAT is a useful treatment for chronic epipharyngitis involving long COVID.; Competing Interests: The authors have declared that no competing interests exist. (Copyright © 2023, Nishi et al.)

Access or request full text: <https://libkey.io/10.7759/cureus.33421>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36618501&custid=ns023446>

38. Case series: Maraviroc and pravastatin as a therapeutic option to treat long COVID/Post-acute sequelae of COVID (PASC)

Item Type: Journal Article

Authors: Patterson, Bruce K.;Yogendra, Ram;Guevara-Coto, Jose;Mora-Rodriguez, Rodrigo;Osgood, Eric;Bream, John;Parikh, Purvi;Kreimer, Mark;Jeffers, Devon;Rutland, Cedric;Kaplan, Gary and Zgoda, Michael

Publication Date: 2023

Journal: Frontiers in Medicine 10, pp. 1122529

Abstract: Post-acute sequelae of COVID (PASC), or long COVID, is a multisystem complication of SARS-CoV-2 infection that continues to debilitate millions worldwide thus highlighting the public health importance of identifying effective therapeutics to alleviate this illness. One explanation behind PASC may be attributed to the recent discovery of persistent S1 protein subunit of SARS-CoV-2 in CD16+ monocytes up to 15 months after infection. CD16+ monocytes, which express both CCR5 and fractalkine receptors (CX3CR1), play a role in vascular homeostasis and endothelial immune surveillance. We propose targeting these receptors using the CCR5 antagonist, maraviroc, along with pravastatin, a fractalkine inhibitor, could disrupt the monocytic-endothelial-platelet axis that may be central to the etiology of PASC. Using five validated clinical scales (NYHA, MRC Dyspnea, COMPASS-31, modified Rankin, and Fatigue Severity Score) to measure 18 participants' response to treatment, we observed significant clinical

improvement in 6 to 12 weeks on a combination of maraviroc 300 mg per oral twice a day and pravastatin 10 mg per oral daily. Subjective neurological, autonomic, respiratory, cardiac and fatigue symptoms scores all decreased which correlated with statistically significant decreases in vascular markers sCD40L and VEGF. These findings suggest that by interrupting the monocytic-endothelial-platelet axis, maraviroc and pravastatin may restore the immune dysregulation observed in PASC and could be potential therapeutic options. This sets the framework for a future double-blinded, placebo-controlled randomized trial to further investigate the drug efficacy of maraviroc and pravastatin in treating PASC.; Competing Interests: IncellDX holds the patent for the use of CCR5 antagonists (maraviroc) in COVID and long COVID. was employed by IncellDX Inc. BP, RY, PP, JB, EO, DJ, CR, and MK were independent contractors of the CCTC. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. (Copyright © 2023 Patterson, Yogendra, Guevara-Coto, Mora-Rodriguez, Osgood, Bream, Parikh, Kreimer, Jeffers, Rutland, Kaplan and Zgoda.)

Access or request full text: <https://libkey.io/10.3389/fmed.2023.1122529>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36844201&custid=ns023446>

39. Long COVID in Children and Young after Infection or Reinfection with the Omicron Variant: A Prospective Observational Study

Item Type: Journal Article

Authors: Pinto Pereira, Snehal, M.; Mensah, Anna; Nugawela, Manjula D.; Stephenson, Terence; Ladhani, Shamez N.; Dalrymple, Emma; Dudley, Jake; McOwat, Kelsey; Simmons, Ruth; Heyman, Isobel; Segal, Terry; Semple, Malcolm G.; Xu, Laila and Shafran, Roz

Publication Date: 2023

Journal: The Journal of Pediatrics 259, pp. 113463

Abstract: To describe the prevalence of long COVID in children infected for the first time (n = 332) or reinfected (n = 243) with Omicron compared with test-negative children (n = 311). Overall, 12%-16% of those infected with Omicron met the research definition of long COVID at 3 and 6 months after infection, with no evidence of difference between cases of first positive and reinfected (P χ^2 = 0.17).; Competing Interests: Declaration of Competing Interest This work is independent research jointly funded by the National Institute for Health and Care Research (NIHR) and UK Research and Innovation (UKRI) (Children & young people with Long COVID (CLoCk) study, Reference COV-LT-0022). All research at Great Ormond Street Hospital Charity NHS Foundation Trust and UCL Great Ormond Street Institute of Child Health is made possible by the NIHR Great Ormond Street Hospital Biomedical Research Centre. S.M.P.P. is supported by a UK Medical Research Council Career Development Award (ref: MR/P020372/1). M.G.S. is supported by The Pandemic Institute, Liverpool and the NIHR Health Protection Research Unit in Emerging and Zoonotic Infections at the University of Liverpool with UK Health Security Agency. The views expressed in this publication are those of the author(s) and not necessarily those of NIHR, The Department of Health and Social Care or UKRI. T.S. is Chair of the Health Research Authority and therefore recused himself from the Research Ethics Application. (Copyright © 2023 The Author(s). Published by Elsevier Inc. All rights reserved.)

Access or request full text: <https://libkey.io/10.1016/j.jpeds.2023.113463>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37172813&custid=ns023446>

40. Long Covid: conceptualizing the challenges for public health

Item Type: Journal Article

Authors: Prashar, Jai

Publication Date: 2023

Journal: Journal of Public Health (Oxford, England)

Abstract: Background: Long Covid has caused significant disruption to public services, economies and population health worldwide, but no single public health approach has proven effective in its management. This essay was the winning entry for the Faculty of Public Health's Sir John Brotherton Prize 2022.; Methods: In this essay, I synthesize existing literature on public health policy in long Covid, and discuss the challenges and opportunities posed by long Covid for the public health profession. The utility of specialist clinics and community care, in the UK and internationally, is examined, as well as key outstanding issues relating to evidence generation, health inequality and defining long Covid. I then use this information to inform a simple conceptual model.; Results: The generated conceptual model integrates community- and population-level interventions; key areas of identified policy need at both levels include ensuring equitable access to long Covid care, developing screening programmes for high-risk populations, co-production of research and clinical services with patients, and using interventions to generate evidence.; Conclusions: Significant challenges remain in the management of long Covid from a public health policy perspective. Multidisciplinary community-level and population-level interventions should be employed with a view to achieving an equitable and scalable model of care. (© The Author(s) 2023. Published by Oxford University Press on behalf of Faculty of Public Health.)

Access or request full text: <https://libkey.io/10.1093/pubmed/fdac153>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37132023&custid=ns023446>

41. Exploring potential biomarkers and therapeutic targets of long COVID-associated inflammatory cardiomyopathy

Item Type: Journal Article

Authors: Qi, Peng;Huang, Mengjie and Zhu, Haiyan

Publication Date: 2023

Journal: Frontiers in Medicine 10, pp. 1191354

Abstract: Background: The negative impact of long COVID on social life and human health is increasingly prominent, and the elevated risk of cardiovascular disease in patients recovering from COVID-19 has also been fully confirmed. However, the pathogenesis of long COVID-related inflammatory cardiomyopathy is still unclear. Here, we explore potential biomarkers and therapeutic targets of long COVID-associated inflammatory cardiomyopathy.; Methods: Datasets that met the study requirements were identified in Gene Expression Omnibus (GEO), and differentially expressed genes (DEGs) were obtained by the algorithm. Then, functional enrichment analysis was performed to explore the basic molecular mechanisms and biological processes associated with DEGs. A protein-protein interaction (PPI) network was constructed and analyzed to identify hub genes among the common DEGs. Finally, a third dataset was introduced for validation.; Results: Ultimately, 3,098 upregulated DEGs and 1965 downregulated DEGs were extracted from the inflammatory cardiomyopathy dataset. A total of 89 upregulated DEGs and 217 downregulated DEGs were extracted from the dataset of convalescent COVID patients. Enrichment analysis and construction of the PPI network confirmed VEGFA, FOXO1, CXCR4, and SMAD4 as upregulated hub genes and KRAS and TXN as downregulated hub genes. The separate dataset of patients with COVID-19 infection used for verification led to

speculation that long COVID-associated inflammatory cardiomyopathy is mainly attributable to the immune-mediated response and inflammation rather than to direct infection of cells by the virus.; Conclusion: Screening of potential biomarkers and therapeutic targets sheds new light on the pathogenesis of long COVID-associated inflammatory cardiomyopathy as well as potential therapeutic approaches. Further clinical studies are needed to explore these possibilities in light of the increasingly severe negative impacts of long COVID.; Competing Interests: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. (Copyright © 2023 Qi, Huang and Zhu.)

Access or request full text: <https://libkey.io/10.3389/fmed.2023.1191354>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37457560&custid=ns023446>

42. Digital Interventions for Treating Post-COVID or Long-COVID Symptoms: Scoping Review

Item Type: Journal Article

Authors: Rinn, Robin;Gao, Lingling;Schoeneich, Sarah;Dahmen, Alina;Anand Kumar, Vinayak;Becker, Petra and Lippke, Sonia

Publication Date: 2023

Journal: Journal of Medical Internet Research 25, pp. e45711

Abstract: Background: Patients with post-COVID/long-COVID symptoms need support, and health care professionals need to be able to provide evidence-based patient care. Digital interventions can meet these requirements, especially if personal contact is limited.; Objective: We reviewed evidence-based digital interventions that are currently available to help manage physical and mental health in patients with post-COVID/long-COVID symptoms.; Methods: A scoping review was carried out summarizing novel digital health interventions for treating post-COVID/long-COVID patients. Using the PICO (population, intervention, comparison, outcome) scheme, original studies were summarized, in which patients with post-COVID/long-COVID symptoms used digital interventions to help aid recovery.; Results: From all scanned articles, 8 original studies matched the inclusion criteria. Of the 8 studies, 3 were "pretest" studies, 3 described the implementation of a telerehabilitation program, 1 was a post-COVID/long-COVID program, and 1 described the results of qualitative interviews with patients who used an online peer-support group. Following the PICO scheme, we summarized previous studies. Studies varied in terms of participants (P), ranging from adults in different countries, such as former hospitalized patients with COVID-19, to individuals in disadvantaged communities in the United Kingdom, as well as health care workers. In addition, the studies included patients who had previously been infected with COVID-19 and who had ongoing symptoms. Some studies focused on individuals with specific symptoms, including those with either post-COVID-19 or long-term symptoms, while other studies included patients based on participation in online peer-support groups. The interventions (I) also varied. Most interventions used a combination of psychological and physical exercises, but they varied in duration, frequency, and social dimensions. The reviewed studies investigated the physical and mental health conditions of patients with post-COVID/long-COVID symptoms. Most studies had no control (C) group, and most studies reported outcomes (O) or improvements in physiological health perception, some physical conditions, fatigue, and some psychological aspects such as depression. However, some studies found no improvements in bowel or bladder problems, concentration, short-term memory, unpleasant dreams, physical ailments, perceived bodily pain, emotional ailments, and perceived mental health.; Conclusions: More systematic research with larger sample sizes is required to overcome sampling bias and include health care professionals' perspectives, as well as help patients mobilize support from health care professionals and social network partners. The evidence so far suggests that patients should be provided with digital interventions to manage symptoms and reintegrate into everyday life, including work. (©Robin Rinn, Lingling Gao, Sarah Schoeneich, Alina Dahmen, Vinayak Anand Kumar, Petra Becker, Sonia Lippke. Originally published in the Journal of Medical Internet Research (<https://www.jmir.org>), 17.04.2023.)

Access or request full text: <https://libkey.io/10.2196/45711>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36943909&custid=ns023446>

43. Fighting Post-COVID and ME/CFS - development of curative therapies

Item Type: Journal Article

Authors: Scheibenbogen, Carmen;Bellmann-Strobl, Judith;Heindrich, Cornelia;Wittke, Kirsten;Stein, Elisa;Franke, Christiana;Prüss, Harald;Preßler, Hannah;Machule, Marie-Luise;Audebert, Heinrich;Finke, Carsten;Zimmermann, Hanna Gwendolyn;Sawitzki, Birgit;Meisel, Christian;Toelle, Markus;Krueger, Anne;Aschenbrenner, Anna C.;Schultze, Joachim L.;Beyer, Marc D.;Ralser, Markus, et al

Publication Date: 2023

Journal: Frontiers in Medicine 10, pp. 1194754

Abstract: The sequela of COVID-19 include a broad spectrum of symptoms that fall under the umbrella term post-COVID-19 condition or syndrome (PCS). Immune dysregulation, autoimmunity, endothelial dysfunction, viral persistence, and viral reactivation have been identified as potential mechanisms. However, there is heterogeneity in expression of biomarkers, and it is unknown yet whether these distinguish different clinical subgroups of PCS. There is an overlap of symptoms and pathomechanisms of PCS with postinfectious myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS). No curative therapies are available for ME/CFS or PCS. The mechanisms identified so far provide targets for therapeutic interventions. To accelerate the development of therapies, we propose evaluating drugs targeting different mechanisms in clinical trial networks using harmonized diagnostic and outcome criteria and subgrouping patients based on a thorough clinical profiling including a comprehensive diagnostic and biomarker phenotyping.; **Competing Interests:** The Charité Universitaetsmedizin Berlin holds a patent for the use of vericiguat in Post-COVID Syndrome. CS, JB-S, CH, KW, ES, CaF, HPru, HPre, M-LM, HA, ChF, HZ, BS, CM, MT, AK, MR, MM, LS, Fko, FP, LB, and SB are employed at Charité Universitaetsmedizin Berlin. CM was employed by Labor Berlin - Charité Vivantes GmbH. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The Handling Editor NS declared a past collaboration with the Author CS. (Copyright © 2023 Scheibenbogen, Bellmann-Strobl, Heindrich, Wittke, Stein, Franke, Prüss, Preßler, Machule, Audebert, Finke, Zimmermann, Sawitzki, Meisel, Toelle, Krueger, Aschenbrenner, Schultze, Beyer, Ralser, Müllleder, Sander, Konietschke, Paul, Stojanov, Bruckert, Hedderich, Knolle, Riemekasten, Vehreschild, Cornely, Behrends and Burock.)

Access or request full text: <https://libkey.io/10.3389/fmed.2023.1194754>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37396922&custid=ns023446>

44. Long COVID Linked With Unemployment in New Analysis

Item Type: Journal Article

Authors: Suran, Melissa

Publication Date: 2023

Journal: Jama 329(9), pp. 701-702

Access or request full text: <https://libkey.io/10.1001/jama.2023.0157>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36790796&custid=ns023446>

45. Clinical features, therapeutic outcomes, and recovery period of long COVID

Item Type: Journal Article

Authors: Takakura, Kazuki;Suka, Machi;Kajihara, Mikio and Koido, Shigeo

Publication Date: 2023

Journal: Journal of Medical Virology 95(1), pp. e28316

Abstract: To characterize the clinical features of long COVID, 286 patients who received care in our outpatient clinic for long COVID from May to December 2021 were surveyed. The recovery periods of each symptom and the key factors contributing to early recovery were statistically analysed. The median age of the patients was 35.8 years, with 137 men and 149 women. The median number of symptoms was 2.8. The most frequent symptoms were respiratory manifestations (52.1%), followed by fatigue (51.4%). Respiratory symptoms, fatigue, and headache/arthritis were major complaints in the initial phase, whereas hair loss was a major complaint in the late phase, suggesting that the chief complaint of patients with long COVID may vary temporally. The best treatment outcome was observed for pulmonary symptoms, and hair loss had the worst outcome. COVID-19 severity, the number of manifestations, and the delay in starting treatment exerted a negative effect on the recovery period of long COVID. In addition, the smoking habit was an independent risk factor for slowing the recovery period from long COVID. This study provides insights into the clinical course of each manifestation and therapeutic options with a more certain future of long COVID to meet the unmet medical needs. (© 2022 The Authors. Journal of Medical Virology published by Wiley Periodicals LLC.)

Access or request full text: <https://libkey.io/10.1002/jmv.28316>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36412057&custid=ns023446>

46. Covid-19: US studies show racial and ethnic disparities in long covid

Item Type: Journal Article

Authors: Tanne, Janice Hopkins

Publication Date: 2023

Journal: BMJ (Clinical Research Ed.) 380, pp. 535

Access or request full text: <https://libkey.io/10.1136/bmj.p535>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36878599&custid=ns023446>

47. Covid-19: Vaccination reduces severity and duration of long covid, study finds

Item Type: Journal Article

Authors: Taylor, Luke

Publication Date: 2023

Journal: BMJ (Clinical Research Ed.) 380, pp. 491

Access or request full text: <https://libkey.io/10.1136/bmj.p491>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36858426&custid=ns023446>

48. **Laboratory Findings and Biomarkers in Long COVID: What Do We Know So Far? Insights into Epidemiology, Pathogenesis, Therapeutic Perspectives and Challenges**

Item Type: Journal Article

Authors: Tsilingiris, Dimitrios;Vallianou, Natalia G.;Karampela, Irene;Christodoulatos, Gerasimos Socrates;Papavasileiou, Georgios;Petropoulou, Dimitra;Magkos, Faidon and Dalamaga, Maria

Publication Date: 2023

Journal: International Journal of Molecular Sciences 24(13)

Abstract: Long COVID (LC) encompasses a constellation of long-term symptoms experienced by at least 10% of people after the initial SARS-CoV-2 infection, and so far it has affected about 65 million people. The etiology of LC remains unclear; however, many pathophysiological pathways may be involved, including viral persistence; a chronic, low-grade inflammatory response; immune dysregulation and a defective immune response; the reactivation of latent viruses; autoimmunity; persistent endothelial dysfunction and coagulopathy; gut dysbiosis; hormonal and metabolic dysregulation; mitochondrial dysfunction; and autonomic nervous system dysfunction. There are no specific tests for the diagnosis of LC, and clinical features including laboratory findings and biomarkers may not specifically relate to LC. Therefore, it is of paramount importance to develop and validate biomarkers that can be employed for the prediction, diagnosis and prognosis of LC and its therapeutic response, although this effort may be hampered by challenges pertaining to the non-specific nature of the majority of clinical manifestations in the LC spectrum, small sample sizes of relevant studies and other methodological issues. Promising candidate biomarkers that are found in some patients are markers of systemic inflammation, including acute phase proteins, cytokines and chemokines; biomarkers reflecting SARS-CoV-2 persistence, the reactivation of herpesviruses and immune dysregulation; biomarkers of endotheliopathy, coagulation and fibrinolysis; microbiota alterations; diverse proteins and metabolites; hormonal and metabolic biomarkers; and cerebrospinal fluid biomarkers. At present, there are only two reviews summarizing relevant biomarkers; however, they do not cover the entire umbrella of current biomarkers, their link to etiopathogenetic mechanisms or the diagnostic work-up in a comprehensive manner. Herein, we aim to appraise and synopsise the available evidence on the typical laboratory manifestations and candidate biomarkers of LC, their classification based on pathogenetic mechanisms and the main LC symptomatology in the frame of the epidemiological and clinical aspects of the syndrome and furthermore assess limitations and challenges as well as potential implications in candidate therapeutic interventions.

Access or request full text: <https://libkey.io/10.3390/ijms241310458>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37445634&custid=ns023446>

49. **Long covid: nearly half of doctors affected can no longer work full time, finds survey**

Item Type: Journal Article

Authors: Waters, Adele

Publication Date: 2023

Journal: BMJ (Clinical Research Ed.) 382, pp. 1529

Access or request full text: <https://libkey.io/10.1136/bmj.p1529>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=37402532&custid=ns023446>

50. Hyperbaric oxygen therapy for the treatment of long COVID

Item Type: Journal Article

Authors: Wilmshurst, Peter;Bewley, Susan and Murray, Patricia

Publication Date: 2023

Journal: Clinical Medicine (London, England) 23(1), pp. 99-100

Access or request full text: <https://libkey.io/10.7861/clinmed.Let.23.1.2>

URL: <https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=mdc&AN=36697009&custid=ns023446>

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