

COVID PATIENT RECOVERY ALLIANCE

The COVID Patient Recovery Alliance is a multi-sector collaboration with the mission to support the energy and innovation of government and private-sector leaders as they care for individuals with long-COVID. The Alliance is developing national solutions that link diverse data sources, improve clinical care pathways, and ensure sustainable federal financial support for the care of these patients. The Alliance is particularly interested in those patients who served their communities and nation when called to duty; whose COVID-19-related costs are extraordinary and burdensome; or who are underserved by existing programs, including racial and ethnic minorities and communities experiencing health disparities.

For more information, please visit our website at COVID19PatientRecovery.org.

PURPOSE OF RESEARCH TRACKER

The research, news, and knowledge of long-COVID is quickly evolving. To stay up-to-date and informed on long-COVID, the Patient Recovery Alliance is performing routine intel scans from a variety of sources – from peer-reviewed publications to various news websites – and on variety of long-COVID-related topics, including health care coverage, workers' compensation, impacted populations, symptoms, and prevalence. The outputs of these intel scans are compiled in this document, which will be periodically updated.

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Date	Article	Publication	Key Takeaways
January 2022			
1/5/2022	South African scientist thinks she may have solved the mystery of long COVID-19, which afflicts 100M people	The Hill	<ul style="list-style-type: none"> • A South African scientist, Resia Pretorius, and her team believe to have found a link between microclots and long-COVID. • The research team found high levels of inflammatory molecules trapped inside microclots in the blood of long-COVID patients. • The research team noted that persistent microclots can result in cells not getting enough oxygen in the tissues to sustain bodily functions, which can result in many of the long-COVID symptoms we see.
1/13/2022	Long COVID: could antiplatelet therapy help?	Medical News Today	<ul style="list-style-type: none"> • Last year, a team of South African researchers from Stellenbosch University found that many people with long-COVID have microclots, which resist the body's ability to dissolve coagulated blood and "trap" inflammatory molecules. • These findings lead to the development of the "microclot model", which suggests that small clots in the capillaries prevent oxygen from reaching the tissues, causing long-COVID. • The same team of researchers conducted a recent study that found clotting in all 70 of the confirmed long-COVID patients whose blood they analyzed. • They also administered a month-long, dual antiplatelet therapy to 24 of the participants, all of whom reported improvements to their long-COVID symptoms. Additionally, blood analysis showed a reduction in microclots in all 24 participants
1/12/2022	Long Covid brain fog found similar to 'chemo brain'; clip on device shows in virus detection	Reuters	<ul style="list-style-type: none"> • People who had COVID-19 report lingering impairments to concentration, attention, cognitive processing speed, and memory, similar to the mental cloudiness that some people experience during and after cancer treatment that is referred to as "chemo brain." • Patients who died of COVID-19 were found to have evidence of inflammation in the brain and high levels of inflammatory proteins, such as CCL11, which is linked to impairments in nervous system health and cognitive function. • Researchers speculate that, although specific testing is needed, treatments showing promise for cancer patients experiencing cognitive impairments could also be beneficial for long COVID patients with similar symptoms.

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1/11/2022	Is 'long Covid' worsening the labor shortage?	Brookings	<ul style="list-style-type: none"> Brookings estimates that as many as 31 million Americans may have experienced, or be experiencing, lingering COVID-19 symptoms. It is unknown exactly how long these symptoms last, but data from the UK shows that more than 70% of long COVID patients still experienced symptoms more than three months after infection. Even with a conservative assumption that long COVID has a three-month duration, Brookings estimates that 4.5 million Americans have been sick with long COVID at any given time between March 2020 and October 2021. However, long COVID is not being sufficiently discussed as a possible contributing factor to the 10.6 million unfilled jobs across the United States, and this blind spot in the conversation is likely due to the inadequate data on long COVID and its impact on the labor market.
1/13/2022	Immunological dysfunction persists for 8 months following initial mild-to-moderate SARS-CoV-2 infection	Nature Immunology	<ul style="list-style-type: none"> A new study out of Australia systematically followed 147 people infected with COVID-19 and found that 20% experienced long-COVID symptoms at 4 months post-infection and immune dysregulation persisted in some for up to eight months, when the study was ended. Researchers analyzed 31 different biomarkers and were able to identify 6 that were associated with long-COVID symptoms. They noted that, for the first four-months after infection, these biomarkers were similar in both the long haulers and those who had not shown persistent symptoms. From four months on, those levels began to drop in non-long-COVID patients but remained elevated in those with long-COVID. Researchers further characterized this immune dysregulation, stating that, "Patients with LC had highly activated innate immune cells, lacked naive T and B cells and showed elevated expression of type I IFN (IFN-β) and type III IFN (IFN-λ1) that remained persistently high at 8 months after infection." The researchers also measured 28 analytes and found the optimal set, combinations of the inflammatory mediators IFN-β, PTX3, IFN-γ, IFN-λ2/3 and IL-6, associated with long-COVID with 78.5-81.5% accuracy. This study was conducted on unvaccinated individuals who were infected in 2020, so it is unknown to the researchers how COVID-19 vaccinations and variants affect these immunological characteristics of long-COVID.
1/19/2022	Mild COVID cases still lead to attention and memory issues - study	Reuters	<ul style="list-style-type: none"> A small, non-randomized study out of Oxford University found that people who had mild cases of COVID-19 and do not suffer from other traditional symptoms of long-COVID

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			<p>could still exhibit deteriorated memory and attention 6 to 9 months post-infection.</p> <ul style="list-style-type: none"> • Participants who had tested positive for COVID-19 previously but did not report having any other symptoms of long-COVID were found to have severe decline in their episodic memory up to 6-months post-infection and difficulty sustaining attention at up to 9-months post-infection. • Researchers said that participants' episodic memory largely returned to normal after 6 months and attention span recovered after 9 months. Additionally, participants who had been infected with COVID-19 did not exhibit decline in other cognitive abilities, such as working memory and planning.
1/17/2022	Association between vaccination status and reported incidence of post-acute COVID-19 symptoms in Israel: a cross-sectional study of patients tested between March 2020 and November 2021	medRxiv	<ul style="list-style-type: none"> • A team of researchers in Israel recently conducted a study to determine if COVID-19 vaccines provide a protective effect against experiencing symptoms of long-COVID. • Individuals who had been PCR tested at participating hospitals between March 2020 and November 2021 were invited to partake in the study. • Using binominal regression, researchers compared self-reported data on post-acute symptoms from 951 infected individuals (of which 637 were vaccinated) and 2437 uninfected individuals. • Compared to unvaccinated individuals who had been infected, infected individuals who had received two doses of the vaccine were: 64% less likely to report experiencing fatigue, 54% less likely to report experiencing headache, 57% less likely to report experiencing weakness, 68% less likely to report experiencing persistent muscle pains. • Additionally, those who had received two doses of the vaccine were no more likely to report any of these symptoms than individuals who had not tested positive for COVID-19. • The researchers concluded, "Our results suggest that, in addition to reducing the risk of acute illness, COVID-19 vaccination may have a protective effect against long COVID."

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1/14/2022	Long-term perturbation of the peripheral immune system months after SARS-CoV-2 infection	BMC Med	<ul style="list-style-type: none"> • Researchers conducted an integrated analysis of immune responses in blood at a transcriptional, cellular, and serological level at 12, 16, and 24 weeks post-infection in 69 patients recovering from mild, moderate, severe, or critical COVID-19 in comparison to healthy uninfected controls. 21 of these patients were referred to a long COVID clinic and over 50% reported ongoing symptoms more than 6 months post-infection. Anti-Spike and anti-RBD IgG responses were largely stable up to 24 weeks post-infection and correlated with disease severity. • Significant differences were found in multiple innate and adaptive immune populations in individuals who had COVID-19, compared to healthy controls. These differences were most strongly evident at 12 and 16 weeks post-infection. • RNA sequencing revealed significant perturbations to gene expression in those who had been infected until at least 6 months post-infection. Researchers also found significant differences in the transcriptome at 24 weeks post infection of individuals were referred to a long-COVID clinic, compared to those who were not. • Researchers conclude that “variation in the rate of recovery from infection at a cellular and transcriptional level may explain the persistence of symptoms associated with long COVID in some individuals.”
1/10/2022	Persistence of SARS CoV-2 S1 Protein in CD16+ Monocytes in Post-Acute Sequelae of COVID-19 (PASC) up to 15 Months Post-Infection	Frontiers in Immunology	<ul style="list-style-type: none"> • Similar to other inflammatory and infectious conditions such as sepsis, lupus erythematosus, and rheumatoid arthritis, researchers detected statistically significant increases of intermediate CD14+, CD16+ monocytes in individuals with long-COVID, compared to healthy controls. In addition, CD14lo, CD16+ non-classical monocytes were also significantly elevated in those with long-COVID. • Neither intermediate nor non-classical monocytes were elevated in individuals severely infected with COVID-19 at the time of study. • Using digital droplet PCR (ddPCR), researchers found that 36% (4 of 11) of severe COVID-19 patients’ peripheral blood mononuclear cells contained SARS-CoV-2 RNA compared to 4% (1/26) of long-COVID patients’ peripheral blood mononuclear cells. The one long-COVID patient that was RNA positive was 15 months post-infection.

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1/19/2022	New Clinical Phenotype of the Post-Covid Syndrome: Fibromyalgia and Joint Hypermobility Condition	Pathophysiology	<ul style="list-style-type: none"> The authors state that fibromyalgia is “considered to be a manifestation of central sensitization, and not an autoimmune disease, but the high prevalence of fibromyalgia in patients with post-COVID-19 conditions requires taking a fresh look at the causes of the disease development.” They identified a combination of symptoms that they cautiously believe represent a clinical pattern, including “young age, female gender, joint hypermobility, the onset of pain after COVID-19, physical traumatization of one particular tendon and the development of the fibromyalgia pain syndrome during the next several weeks...an increase in the titer of antinuclear antibodies, and some other systemic inflammation factors.” They hypothesize that COVID-19 can act as a trigger for local damage to the connective tissue in patients with joint hypermobility, possibly leading to the development of fibromyalgia syndrome, and they present three clinical cases which illustrate this hypothesis.
1/20/2022	A prospective cohort study of COVID-19 vaccination, SARS-CoV-2 infection, and fertility	American Journal of Epidemiology	<ul style="list-style-type: none"> An NIH-funded study of more than 2,000 couples found that COVID-19 vaccination does not affect the chances of conceiving a child, but COVID-19 infection could. Researchers found that couples had an 18% lower chance of conception if the male partner had been infected with SARS-CoV-2 within 60 days before a menstrual cycle. These findings suggest that COVID-19 could reduce male fertility temporarily, as no difference was found in conception rates for couples in which the male partner had tested positive more than 60 days before a cycle and those in which the male partner had not been infected.
1/14/2022	Female Sex Is a Risk Factor Associated with Long-Term Post-COVID Related-Symptoms but Not with COVID-19 Symptoms: The LONG-COVID-EXP-CM Multicenter Study	Journal of Clinical Medicine	<ul style="list-style-type: none"> A team of Spanish researchers conducted a cross-sectional cohort study involving 1,969 individuals who were hospitalized due to COVID-19 in 5 Madrid hospitals between March 10 and May 31, 2020 and found a gender disparity in the prevalence of long-COVID. While COVID-19 symptoms at hospital admission were similar in males and females, females were more likely than males to develop post-COVID symptomatology eight months after hospital discharge. “After adjusting by all variables, female sex was associated with ≥ 3 post-COVID symptoms, the presence of post-COVID fatigue, dyspnea, pain, hair loss, ocular problems, depressive levels, and worse sleep quality. Female sex was a risk factor for the development of some long-term post-COVID symptoms including mood disorders.”

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1/26/2022	Self-reported long COVID after two doses of a coronavirus (COVID-19) vaccine in the UK - Office for National Statistics (ons.gov.uk)	Office for National Statistics	<ul style="list-style-type: none"> “In a sample of UK adults aged 18 to 69 years, receiving two doses of a coronavirus (COVID-19) vaccine at least two weeks before a first test-confirmed COVID-19 infection was associated with a 41.1% decrease in the odds of self-reported long COVID at least 12 weeks later, relative to socio-demographically similar study participants who were not vaccinated when infected.”
1/25/2022	Immunoglobulin signature predicts risk of post-acute COVID-19 syndrome Nature Communications	Nature Communications	<ul style="list-style-type: none"> The group of patients who developed long-COVID had the following characteristics: Higher percentage of severe COVID-19 cases (odds ratio 3.87; p=0.001), more often required hospitalization (odds ratio 2,55; p=0.014), More COVID-19-related symptoms during initial infection (odds ratio 1.81; p=0.001), decreased levels of two immunoglobulins, IgM and IgG3, at the time of infection and at 6-month follow up, asthmatic, and higher age (odds ratio 1.67; p=0.008). “94% of individuals with a history of asthma bronchiale developed PACS (long-COVID) and 71% developed post-COVID-19 syndrome, defined as prolonged symptoms for more than 12 weeks after symptom onset. 59% of individuals without a history of asthma bronchiale developing PACS and 42% developing post-COVID-19 syndrome” These findings were translated into a model, termed PACS score, which, when applied to our cohort comprising 134 followed-up and extensively characterized COVID-19 patients, the PACS score performed better than a symptom-based score, was independent of timepoint of testing and sex, and only required broadly available Ig measurements rather than specialized tests, such as SARS-CoV-2-specific immunoassays.”
1/21/2022	“I feel like my body is broken”: Exploring the experiences of people living with long COVID	medRxiv	<ul style="list-style-type: none"> Of the 169 participants in this study, almost 90% were women, ~33% were 40-49 years old, and all reported having long-COVID for at least 6 months. The results showed that the symptoms and impacts fell into several categories. Common themes were debilitating and multiple symptoms, loss of exercise, impact on daily functioning, no support system, loss of identity, uncertain prognosis. Researchers state, “More support and recognition for the condition are needed to help this cohort navigate the process of adapting to long COVID.”

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1/23/2022	The Effects of Messaging on Expectations and Understanding of Long COVID: An Online Randomised Trial medRxiv	medRxiv	<ul style="list-style-type: none"> • An online experiment found that different communication strategies on expectations of long-COVID have significant effects on symptom duration, treatment control, personal control, and illness coherence. • When the illness was described as long-COVID rather than ongoing COVID-19 recovery, participants reported longer expected symptom duration and reduced illness coherence. • When illness uncertainty was emphasized, participants reported longer expected symptom duration, lower expected efficacy of treatment, and less understanding of their illness. • When information about support was enhanced, compared to basic support information, participants reported higher expected control over their own symptom management and higher expected efficacy of treatment. • Additionally, participants who received enhanced support information, and an illness description of ongoing COVID-19 recovery, reported greater understanding of their illness than those who received basic support information and an illness description of long-COVID.
1/20/2022	High prevalence of olfactory disorders 18 months after contracting COVID-19 medRxiv	medRxiv	<ul style="list-style-type: none"> • Scientists at Stockholm’s Karolinska Institute studied 100 people who had contracted COVID-19 in 2020 and found that 65% showed some long-term impact on their sense of smell. • Only a small percentage had lost their sense of smell entirely, and the most common olfactory symptom of those effected was found to be a loss in the ability to distinguish between smells. • Researchers noted that most participants did not realize that they had a distorted sense of smell until the study was conducted; and stated that these olfactory problems are likely permanent given the amount of time that has passed since the initial infection.
1/23/2022	Long Covid: nearly 2m days lost in NHS staff absences in England Long Covid The Guardian	The Guardian	<ul style="list-style-type: none"> • In England, The All-Parties Parliamentary Group on coronavirus estimates that, between March 2020 and September 2021, more than 1.82 million working days were lost for healthcare workers across 219 NHS trusts. • Four NHS trusts provided details on the duration of staff absences due to long Covid and suggest that staff were off for more than 80 days with long-term symptoms, on average.

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1/25/2022	CDC long covid race and gender data sought by House lawmakers - The Washington Post	The Washington Post	<ul style="list-style-type: none"> Rep Don Beyer (D-VA) and Rep. Ayanna Presley (D-Mass) asked the Centers for Disease Control and Prevention in a letter Tuesday to release data on the number of Americans who suffer lingering symptoms of coronavirus infection, including breakdowns along race, gender and age.
1/28/2022	Leave no one behind: inclusion of alpha-1 antitrypsin deficiency patients in COVID-19 vaccine trials	European Journal of Human Genetics	<ul style="list-style-type: none"> Emerging evidence suggests that α-1 antitrypsin (A1AT) plays a critical role in preventing SARS-CoV-2 infection and may be a promising therapeutic option for patients with COVID-19. A1AT deficiency (AATD) is an inherited disease characterized by dysfunctional or insufficient levels of A1ATs and is associated with a risk of developing COPD and asthma, which evidence suggests are associated with an increased risk of developing long-COVID. It can therefore be hypothesized that AATD individuals are at greater risk of long COVID. Patients with AATD may derive limited benefit from the current COVID-19 vaccines, but this population has not been included in the COVID-19 vaccine clinical trials and studies have yet to characterize the safety, immunogenicity, and efficacy of COVID-19 vaccines for AATD patients.
1/24/2022	Multiple Early Factors Anticipate Post-Acute COVID-19 Sequelae	Cell	<ul style="list-style-type: none"> A deep multi-omic, longitudinal investigation of 309 COVID-19 patients from initial diagnosis to convalescence (2-3 months later), integrated with clinical data and patient-reported symptoms found four long-COVID-anticipating risk factors at the time of initial COVID-19 diagnosis: type 2 diabetes, SARS-CoV-2 RNAemia, reactivation of the Epstein-Barr virus (which infects most people, typically at a young age, and becomes dormant), and the presence of specific autoantibodies. The researchers state, “We find that immunological associations between PASC factors diminish over time, leading to distinct convalescent immune states. Detectability of most PASC factors at COVID-19 diagnosis emphasizes the importance of early disease measurements for understanding emergent chronic conditions and suggests PASC treatment strategies.”
1/31/2022	Omicron amps up concerns about long COVID and its causes	The Associated Press	<ul style="list-style-type: none"> Key theories of the cause of long-COVID: (1) infection or remnants of the virus persist past the initial illness, triggering inflammation that leads to long COVID, (2) latent viruses in the body are reactivated, (3) autoimmune responses develop after acute COVID-19 (could explain why long-COVID is more prevalent in females), (4) micro-clotting

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			<ul style="list-style-type: none"> Emerging evidence out of the U.S. and Israel suggests that COVID-19 vaccines could prevent long-COVID or at least reduce the severity. A team of researchers at Yale University is collaborating with a patient group called Survivor Corps on a study that involves vaccinating previously unvaccinated long COVID patients as a possible treatment. The South African scientist studying the micro-clot theory said: “So many people are losing their livelihoods, their homes. They can’t work anymore. Long COVID will probably have a more severe impact on our economy than acute COVID.”
1/28/2022	The Investigation of Pulmonary Abnormalities using Hyperpolarised Xenon Magnetic Resonance Imaging in Patients with Long-COVID	NIHR Oxford Biomedical Research Centre	<ul style="list-style-type: none"> For the majority of people with long COVID, gas transfer was less effective than in healthy controls. Similar abnormalities were found in those who had been hospitalized for COVID-19.
1/26/2022	Gut microbiota dynamics in a prospective cohort of patients with post-acute COVID-19 syndrome	BMJ Gut	<ul style="list-style-type: none"> 76% of patients had PACS and the most common symptoms were fatigue, poor memory and hair loss. Gut microbiota composition at admission was associated with occurrence of PACS, characterized by: higher levels of Ruminococcus gnavus and Bacteroides vulgatus and lower levels of Faecalibacterium prausnitzii. Persistent respiratory symptoms were correlated with opportunistic gut pathogens, and neuropsychiatric symptoms and fatigue were correlated with nosocomial gut pathogens, including Clostridium innocuum and Actinomyces naeslundii Butyrate-producing bacteria, including Bifidobacterium pseudocatenulatum and Faecalibacterium prausnitzii showed the largest inverse correlations with PACS at 6 months. Patients without PACS showed recovered gut microbiome profile at 6 months comparable to that of non-COVID-19 controls
1/27/2022	Post-acute COVID-19 syndrome in patients after 12 months from COVID-19 infection in Korea	BMC Infectious Disease	<ul style="list-style-type: none"> Participants were between the ages of 17 and 70 with a median age of 37; 68% women; 80.5% had mild COVID-19 and only 2.5% severe. The median time between date of first symptom onset/COVID-19 diagnosis and time of participating in the survey was 454 days. Results: 52.7% still experienced COVID-19 related persistent symptoms; 5% of total participants were receiving outpatient treatment for these symptoms. The main symptoms were: difficulty in concentration, cognitive dysfunction, amnesia, fatigue, depression, and anxiety. 41.7% of respondents

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			<p>had anxiety or depression. Older age, female sex, and disease severity were identified as risk factors for persistent neuropsychiatric symptoms</p>
1/21/2022	<p>Chronic fatigue syndrome and cognitive deficit are associated with acute-phase neuropsychiatric manifestations of COVID-19: A 9-month follow-up study</p>	Neurological Sciences	<ul style="list-style-type: none"> • Most common long-COVID symptoms reported: easy fatigability (51.04%), anxiety (38.54%), dyspnea (38.54%), new-onset headache (38.54%). 90% of patients showed at least one long-COVID symptom in their follow-up. Chronic fatigue syndrome was more common in females (64%) than males (36%). Age was not a significant factor. Acute-phase symptoms predicted follow-up symptoms. There was no significant association between COVID-19 severity in the acute phase and the number of long-COVID symptoms. There was also no significant association between COVID-19 severity in the acute phase and having chronic fatigue syndrome in the future as a long-COVID symptom