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Latest News on Long COVID

Biological Sex Differences: Key to Understanding Long COVID?

Letícia Soares was infected with COVID-19 in April 2020, in the final year of postdoctoral studies in disease ecology at a Canadian University. What started with piercing migraines and severe fatigue in 2020 soon spiraled into a myriad of long COVID symptoms: Gastrointestinal issues, sleep problems, joint and muscle pain, along with unexpected menstrual changes. After an absence of menstrual bleeding and its usual signs, she later suffered from severe periods and symptoms that worsened her long COVID condition. "It just baffled me," said Soares, now 39. " It was debilitating." Cases like Soares's are leading scientists to spend more time trying to understand the biological sex disparity in chronic illnesses such as long COVID that until recently have all but been ignored. According to the Centers for Disease Control and Prevention, long COVID affects nearly twice as many women as men.

Study shows 43% to 58% lower prevalence of long COVID among vaccinated people

A new study based on 4,605 participants in the Michigan COVID-19 Recovery Surveillance Study shows that the prevalence of long COVID symptoms at 30 and 90 days post-infection was 43% to 58% lower among adults who were fully vaccinated before infection. The study appeared yesterday in the *Annals of Epidemiology*. The 30- and 90-day timeframes were meant to compare two different definitions of long COVID. The US Centers for Disease Control and Prevention defines the condition as new or persistent symptoms 4 weeks after infection, while the World Health Organization definition defines it as 12 or more weeks after infection. "By assessing both 30-day and 90-day long COVID, we increased the number of studies with which our results can be compared, facilitating discussion regarding consistency of estimates. It also acknowledges the importance of both outcomes," the authors wrote. "Whether symptoms persist for at least 30 or at least 90 days, both have the potential to cause significant disruption to daily life."

Young adults have higher rates of long COVID than older Americans: See the charts

Nearly one in four adults who contracted COVID-19 developed long COVID symptoms, according to the most recent data from the Census Bureau. Although research to treat these symptoms is still underway, much progress has been made since the emergence of long COVID, a condition that can devastate people's lives for months or years. Anyone infected with COVID-19 can develop long COVID, but the condition is more common in people who had severe COVID-19 symptoms, as well as women, older adults, people with underlying health conditions and people who did not get vaccinated, according to the Washington state Health Department. People who get COVID-19 multiple times may also have more health risks including long COVID.

Long COVID: Another Great Pretender

Has COVID replaced syphilis as the great imitator? At the turn of the 20th century, Sir William Osler was quoted as saying, "He who knows syphilis knows medicine." If you have any doubts about the "imitator" analogy, simply use any broad search engine or AI portal and enter "What is the differential diagnosis of primary syphilis, secondary syphilis, or tertiary syphilis?" A plethora of diseases across many body systems appear.

Another Great Pretender?

Did you or do you now have long COVID? How do you know? Do you even know what long COVID is? How would you diagnose it? When asked about long COVID, this is what large language model

source bard.google.com had to say: Long COVID, also known as post-COVID conditions or PASC, is a complex condition that can occur in people who have had COVID-19, even if their initial illness was mild or even asymptomatic.

Researchers identify mechanism behind brain fog in long COVID

Disruptions in the blood-brain barrier along with a hyperactive immune system are the likely mechanisms behind "brain fog" in patients who are experiencing long COVID, an Irish research team reported today in *Nature Neuroscience*. Brain fog has been reported during acute COVID infection and has also been reported in nearly 50% of patients who experience long COVID, or symptoms well past the acute phase of COVID-19.

Clues from blood markers and brain MRI

The blood-brain barrier disruption mechanism was suspected before, but to test the connection, the group first analyzed blood samples to look for any biomarker differences between those who did and didn't report brain fog.

Study IDs Immune Abnormality Possibly Causing Long COVID

Swiss scientists have identified immune system abnormalities in patients with long COVID that might open the door to new diagnostic tests and treatments. The researchers found that a group of proteins in the blood that are part of the body's immune response called the "complement system" are not working properly in patients with long COVID. Blood samples turned up important differences between those who recovered from COVID and those who did not. These differences might be used as biomarkers to diagnose long COVID and might even point the way to new treatments for the condition, the researchers said. By testing for 6500 blood proteins in about 300 patients, the Swiss researchers found that dysfunctional complement system proteins could possibly explain fatigue and "smoldering inflammation," said Onur Boyman, MD, a professor of immunology from University Hospital Zurich in Zurich, Switzerland.

Study shows persistent COVID-19 infections fairly common

Researchers at the University of Oxford published new findings yesterday in *Nature* suggesting as many as 1 to 3 out of every 100 COVID-19 infections in the United Kingdom persist longer than 30 days, and patients with persistent infections are 55% more likely to report developing long COVID. Persistent infections have long been a concern to COVID-19 researchers, because people with prolonged infections tend to display a high number of viral mutations, making them reservoirs of new variants. Previously, this concern focused on immunocompromised patients, but the new study suggests these types of long infections may be more common than previously thought. The study was based on 3,603 participants who provided two or more positive viral samples for genomic sequencing from November 2020 through August 2022 as part of the Office for National Statistics COVID Infection Survey (ONS-CIS). The two positive tests to define persistent infections had to be taken at least 26 days apart.

New Evidence Suggests Long COVID Could Be a Brain Injury

Brain fog is one of the most common, persistent complaints in patients with long COVID. It affects as many as 46% of patients who also deal with other cognitive concerns like memory loss and difficulty concentrating. Now, researchers believe they know why. A new study has found that these symptoms may be the result of a viral-borne brain injury that may cause cognitive and mental health issues that persist for years. Researchers found that 351 patients hospitalized with severe

COVID-19 had evidence of a long-term brain injury a year after contracting the SARS-CoV-2 virus. The findings were based on a series of cognitive tests, self-reported symptoms, brain scans, and biomarkers.

Long Covid research funding at NIH gets a nearly 50% boost

WASHINGTON — The Biden administration has dedicated an additional $515 million to a major initiative to study long Covid, a nearly 50% increase to the project's budget. The research initiative at the National Institutes of Health, dubbed RECOVER, was created in 2020 with a $1.15 billion investment in research to understand and investigate treatments for long Covid. The project has faced headwinds: STAT and MuckRock investigations showed that the project started off very sluggishly, and timelines slipped repeatedly. Patients also expressed strong concerns that too few resources were being devoted to testing potential treatments. At the time, the government said it did not have any more money to devote to the work. The NIH said that the funding would be used to test additional treatments in clinical trials, to study how long Covid affects each part of the body, to examine who fully recovers long term, and to maintain research infrastructure.

Millions of people have long Covid, including children and pregnant people, studies show

CNN — Millions of people deal with Covid-19 symptoms long after their initial infections. Two new studies – one looking at pregnant people and the other on children – give a better look at the burden from this health problem that doctors say often goes under the radar. The first study says that 1 in 10 people who had Covid when they were pregnant will develop long-term symptoms. The results were shared Monday at the Society for Maternal-Fetal Medicine's annual meeting in National Harbor, Maryland. The researchers used data from the National Institutes of Health's Recover Initiative, a project created to determine the long-term effects of Covid in adults and children. Of the 1,503 people who were pregnant in the dataset, 9.3% reported having symptoms six months or more after they were infected. The most common symptom was a feeling of being tired after light physical or mental activity. Some also reported dizziness.

Can exercise help treat long Covid? New study finds patients improve with self-paced approach

Fatigue leads the list of persistent problems experienced by people with long Covid — which is why patients have pushed back against treatment approaches that endorse escalating levels of exercise for a condition that researchers are still trying to understand. They fear post-exertional malaise, the debilitating price to be paid for pushing their bodies too hard. Researchers from the U.K. were well aware of those potential harms. Working with patients, they designed a trial called REGAIN to test a way to provide mental health therapy and exercise guidance to people with long Covid without making their conditions worse. Their goal was to help people manage their symptoms, improve their functioning, and reduce their distress. On Wednesday, they reported in BMJ that people enrolled in an online program said their health improved more than people who received standard care, which was a one-hour advice session on how to cope with such problems as fatigue, shortness of breath, brain fog, and muscle aches.

Five Bold Predictions for Long COVID in 2024

With a number of large-scale clinical trials underway and researchers on the hunt for new therapies, long COVID scientists are hopeful that this is the year patients — and doctors who care for them — will finally see improvements in treating their symptoms. Here are five bold predictions —

all based on encouraging research — that could happen in 2024. At the very least, they are promising signs of progress against a debilitating and frustrating disease.

#1: We'll gain a better understanding of each long COVID phenotype.

This past year, a wide breadth of research began showing that long COVID can be defined by a number of different disease phenotypes that present a range of symptoms. Researchers identified four clinical phenotypes: Chronic fatigue-like syndrome, headache, and memory loss; respiratory syndrome, which includes cough and difficulty breathing; chronic pain; and neurosensorial syndrome, which causes an altered sense of taste and smell.

Study finds blood changes in long-COVID patients

An analysis published today in *Science* examined blood samples from patients with long COVID and found significant serum protein changes, opening the door to developing biomarker-based tests to identify the condition. The protein changes suggest a significant alteration of the complement system, which results in the immune system remaining activated and inflamed after acute infection, the authors explained. The complement system also controls blood clotting and the repair of damaged tissue, and dysregulation of complement proteins could be behind the wide and varied symptoms experienced by long-COVID patients.

Why Are Women More Likely to Get Long COVID?

Annette Gillaspie, a nurse in a small Oregon hospital, hoped she would be back working with patients by now. She contracted COVID-19 on the job early in the pandemic and ended up with long COVID. After recovering a bit, her fatigue and dizziness returned, and today she is still working a desk job. She has also experienced more severe menstrual periods than before she had COVID. "Being a female with long COVID definitely does add to the roller-coaster effect of symptoms," Gillaspie said. Long COVID affects nearly twice as many women as men, with 6.6% of women reporting long COVID compared with 4% of men, according to a recent Census Bureau survey reported by the Centers for Disease Control and Prevention (CDC). Researchers are trying to determine why, what causes the gender disparity, and how best to treat it.

More evidence vaccination reduces risk of long COVID

A large staggered cohort study from primary care patients in the UK, Spain, and Estonia finds that COVID-19 vaccination consistently reduced the risk of long-COVID symptoms. The study is published in *The Lancet Respiratory Medicine*. The study used the World Health Organization's (WHO) definition of post-COVID condition, or long COVID, as new or persisting symptoms 3 months after infection that cannot be explained by alternative causes. The WHO recognizes 25 long COVID symptoms, including fatigue, shortness of breath, and cognitive dysfunction. In total, more than 10 million vaccinated people and 10 million unvaccinated people from each of the three countries and four databases were compared, and the effectiveness of vaccination with either ChAdOx1 (AstraZeneca) and BNT162b2 (Pfizer-BioNTech) was assessed.

Long COVID Has Caused Thousands of US Deaths: New CDC Data

While COVID has now claimed more than 1 million lives in the United States alone, these aren't the only fatalities caused at least in part by the virus. A small but growing number of Americans are

surviving acute infections only to succumb months later to the lingering health problems caused by long COVID. Much of the attention on long COVID has centered on the sometimes-debilitating symptoms that strike people with the condition, with no formal diagnostic tests or standard treatments available, and the effect it has on quality of life. But new figures from the US Centers for Disease Control and Prevention (CDC) show that long COVID can also be deadly. More than 5000 Americans have died from long COVID since the start of the pandemic, according to new estimates from the CDC.

Monoclonal Antibodies: A New Treatment for Long COVID?

A treatment used to treat acute COVID-19 infection has also been found to be effective against long COVID, a new small study has found. The research, which assessed the benefits of monoclonal antibodies, suggests relief may finally be ahead for millions of Americans with long COVID for whom treatment has remained elusive. The study, published in the *American Journal of Emergency Medicine*, found three Florida patients with long COVID made complete — and sudden — recoveries after they were given the monoclonal antibody cocktail casirivimab/imdevimab (Regeneron).

Long COVID changes heart rate variability, study suggests

According to a small case-control study today in *Scientific Reports*, long COVID can affect heart rate variability (HRV) at rest and during deep breathing, adding to the evidence that persistent symptoms of the virus can be associated with cardiac and dysfunction of the autonomic nervous system (dysautonomia). This system regulates involuntary functions like heartbeat, blood pressure, and sweating. The study, conducted by Brazilian researchers, included 21 patients with long COVID and 20 controls. Long COVID—defined by the authors as new or persistent symptoms experienced 12 or more weeks after infection—has been associated with heart palpitations, orthostatic intolerance (difficulty staying upright), dizziness, and syncope.

Chest Pain With Long COVID Common but Undertreated

As many as 87% of patients experience symptoms after COVID-19 infection that last 2 months or more, one of the most common being chest pain. And chronic chest discomfort may persist in some individuals for years after COVID, warranting future studies of reliable treatments and pain management in this population, a new study shows. "Recent studies have shown that chest pain occurs in as many as 89% of patients who qualify as having long COVID," *said Ansley Poole, an undergraduate student at the University of South Florida in Tampa,* who *conducted the research under the supervision of Christine Hunt, DO, and her colleagues at Mayo Clinic, in Jacksonville, Florida.*

Studies Investigate Whether Antivirals Like Paxlovid May Prevent Long COVID

The US Food and Drug Administration has yet to approve any drugs for preventing or treating post–COVID-19 condition, also known as long COVID—defined by the US government as health issues that continue or develop 4 weeks or more after an initial SARS-CoV-2 infection. But 2 recent observational studies took a close look at whether existing antiviral treatments for COVID-19 may protect against developing long COVID down the line. “Overall, any preventive measures (like vaccines) or treatments that decrease the severity of acute COVID are likely to lead to reduced risk of persistent symptoms,” Benjamin Abramoff, MD, MS, an assistant professor of clinical physical medicine and rehabilitation at the University of Pennsylvania, told *JAMA* in an email.

3-year outcomes of discharged survivors of COVID-19 following the SARS-CoV-2 omicron (B.1.1.529) wave in 2022 in China: a longitudinal cohort study

Summary

Background: There is a paucity of data on the natural trajectory of outcomes in survivors of COVID-19 beyond 2 years after symptom onset, and no evidence exists on the effect of re-infection in people with long COVID symptoms. We aimed to investigate the 3-year health outcomes of COVID-19 survivors and the effect of omicron re-infection.

Synbiotics in post-acute COVID-19 syndrome—a potential new treatment framework?

As the world continues to recover from the impact of the COVID-19 pandemic, a new challenge has emerged in the form of post-acute COVID-19 syndrome (PACS), also known as long COVID. Characterised by multisystem involvement, PACS can lead to a substantial decline in quality of life, presenting a complex clinical picture that spans persistent debilitating cardiopulmonary, gastrointestinal, and neuropsychiatric symptoms, alongside profound fatigue. An estimated 65 million people worldwide are thought to have PACS, with a consequent effect on global workforces.[1] No effective treatment has yet been identified.

Studies suggest even one vaccine dose may cut risk of long COVID

Two new analyses from Sweden and Pakistan published in *BMJ* highlight the benefits of partial or full COVID-19 vaccination in preventing persistent symptoms.

Vaccination tied to 58% lower risk of long COVID: In Sweden, University of Gothenburg researchers led an observational evaluation of the efficacy of primary COVID-19 vaccination (two doses followed by a booster) against long COVID, or post-COVID condition (PCC), among adults whose first infections were recorded in a national registry from December 2020 to February 2022. Average follow-up was 129 days.

New Tests May Finally Diagnose Long COVID

One of the biggest challenges facing clinicians who treat long COVID is a lack of consensus when it comes to recognizing and diagnosing the condition. But a new study suggests testing for certain biomarkers may identify long COVID with accuracy approaching 80%. Effective diagnostic testing would be a game-changer in the long COVID fight, for it's not just the fatigue, brain fog, heart palpitations, and other persistent symptoms that affect patients. Two out of three people with long COVID also suffer mental health challenges like depression and anxiety. Some patients say their symptoms are not taken seriously by their doctors.

Nearly half of US veterans had long-COVID symptoms up to 6 months later

Nearly half of 363,000 US veterans who tested positive for COVID-19 still had symptoms up to 6 months later, and the risk factors for this condition were Black race, older age, diabetes, and severe infection, concludes a study published yesterday in the *Annals of Epidemiology*. Researchers from Emory University and the Atlanta Veterans Affairs (VA) Medical Center retrospectively determined the rates of and risk factors for long COVID (also called post-acute sequelae of COVID-

19 [PASC]) among 363,825 veterans who tested positive for COVID-19 from February 2020 to September 2022.

MRI study spotlights impact of long COVID on the brain

A new study comparing magnetic resonance imaging (MRI) images of patients with long COVID, fully recovered COVID-19 survivors, and healthy controls shows microstructural changes in different brain regions in the long-COVID patients. The findings will be presented next week at the annual meeting of the Radiological Society of North America. The research is the first to use diffusion microstructure imaging (DMI), a novel MRI technique, which looks at the movement of water molecules in tissues. DFI can detect smaller brain changes than traditional MRI.

Long COVID and Mental Illness: New Guidance

Long COVID can exacerbate existing mental health disorders or cause new-onset psychiatric symptoms, but mental illness does not cause long COVID, experts say. The consensus guidance statement on the assessment and treatment of mental health symptoms in patients with post-acute sequelae of SARS-CoV-2 infection (PASC), also known as long COVID, was published online in *Physical Medicine and Rehabilitation*, the journal of the American Academy of Physical Medicine and Rehabilitation (AAPM&R).

Severe COVID-19 tied to prolonged cough, sputum production in long COVID

A study of long-COVID patients in Japan links severe infection to persistent cough and sputum production. A team led by researchers from Keio University in Tokyo enrolled hospitalized adults diagnosed as having COVID-19 from January 2020 to February 2021 in a 26-center study. They collected clinical hospital data and patient-reported outcomes from questionnaires and smartphone apps for 12 months after release.

Long COVID in the United States

Abstract: Although yet to be clearly identified as a clinical condition, there is immense concern at the health and wellbeing consequences of long COVID. Using data collected from nearly half a million Americans in the period June 2022-December 2022 in the US Census Bureau's Household Pulse Survey (HPS), we find 14 percent reported suffering long COVID at some point, half of whom reported it at the time of the survey. Its incidence varies markedly across the United States–from 11 percent in Hawaii to 18 percent in West Virginia–and is higher for women than men, among Whites compared with Blacks and Asians, and declines with rising education and income.

A New Long COVID Explanation: Low Serotonin Levels?

Could antidepressants hold the key to treating long COVID? University of Pennsylvania researchers have uncovered a link between long COVID and levels of serotonin in the body that may offer a new explanation for the condition. The study even points to a possible treatment. Serotonin is a neurotransmitter that has many functions in the body and is targeted by the most commonly

prescribed antidepressants — the selective serotonin reuptake inhibitors (SSRIs). Serotonin is widely studied for its effects on the brain — it regulates the messaging between neurons, affecting sleep, mood, and memory.

Long COVID Lasts At Least 18 Months for Most People: Study

A new study out of Denmark showed that more than half of people with severe cases of long COVID failed to improve after a year and a half. The study also showed that severe symptoms lasted for at least 18 months regardless of which variant of SARS-CoV-2 — the virus that causes COVID — infected the person. The authors called that finding "surprising," noting that other studies have suggested that long COVID became less common as the pandemic progressed. The findings were published this week in the *International Journal of Infectious Diseases.*

COVID-19 that confines you to bed for several days most likely to lead to long COVID, study finds

Today in *The Lancet Regional Health – Europe*, a group of multinational researchers conclude that most Scandinavians who have long-COVID symptoms at 2 years had severe infections. The observational study, led by Tongji University in China, compared the prevalence of 15 physical symptoms, assessed using the 15-item Patient Health Questionnaire (PHQ-15) among 64,880 adults with or without a COVID-19 diagnosis from Denmark, Iceland, Norway, and Sweden from April 2020 to August 2022.

Review estimates 69% 3-dose vaccine efficacy against long COVID

A meta-analysis today in *Antimicrobial Stewardship & Healthcare Epidemiology* estimates a vaccine effectiveness (VE) of 69% for three doses of COVID-19 vaccine against long COVID, while two doses offer 37% efficacy. Led by researchers at the University of Iowa, the meta-analysis involved 24 studies on COVID-19 VE against long COVID among recipients of at least two doses of a vaccine before or after infection from December 2019 to June 2023.

Inflammation in severe COVID linked to bad fungal microbiome

An imbalance of fungi in the gut could contribute to excessive inflammation in people with severe COVID-19 or long COVID. A study found that individuals with severe disease had elevated levels of a fungus that can activate the immune system and induce long-lasting changes. The work, published on 23 October in *Nature Immunology*1, raises the possibility that antifungal treatment could provide some relief to people who are critically ill with COVID-19. “We know inflammation is driving severe disease,” says Martin Hönigl, a clinical mycology researcher at the Medical University of Graz in Austria, who was not involved in the study.

Not 'little adults': Experts say long COVID undercounted, misdiagnosed in kids

Research on long COVID in children is limited, and reported prevalences range widely, from less than 1% to 70%. And while it's a relatively new condition in an evolving field, experts say it could be better defined and measured through well-designed longitudinal studies that take children's unique presentations into account. "I think it's largely because we're trying to apply adult framework to

pediatric problems, and as a result, a lot of things are missed," David Putrino, PhD, director of rehabilitation innovation for the Mount Sinai Health System in New York, told CIDRAP News.

Serotonin reduction in post-acute sequelae of viral infection

Highlights

- Long COVID is associated with reduced circulating serotonin levels.
- Serotonin depletion is driven by viral RNA-induced type I interferons (IFNs)
- IFNs reduce serotonin through diminished tryptophan uptake and hypercoagulability.
- Peripheral serotonin deficiency impairs cognition via reduced vagal signaling.

People With Long COVID Face Alarming Rates of Depression, Anxiety: Expert Q&A

As many as 2 out of 3 people with long COVID also have mental health challenges, including high rates of depression and anxiety, new research shows. It's a surprising finding that shows that those with long COVID may experience more mental distress than people with other chronic illnesses, such as Alzheimer's disease, cancer, diabetes, and cardiovascular disease. The study, published in *The Lancet*, followed 236,379 patients with long COVID. The investigators found that 62% of patients had received either a neurologic or a psychological diagnosis 6 months after being diagnosed with acute COVID.

Long COVID has affected nearly 7% of American adults, CDC survey data finds

Millions of Americans report having long COVID, either previously or at the time of being surveyed, according to new data from the the Centers for Disease Control and Prevention's National Center for Health Statistics. In reports published Tuesday using data from 2022 National Health Interview Survey, the agency said 6.9% of U.S. adults reported ever having long COVID, while 3.4% said they currently had the condition at the time of interview. Based on U.S. Census data, that would mean nearly 18 million have suffered from the condition at some point since the pandemic began, and almost 9 million did at the time of the survey.

People With Long COVID Have Specific Blood Biomarkers, Study Says

People with long COVID have specific biomarkers in their blood, a study published Monday in *Nature* said. The findings may be a step toward creating blood tests to positively identify people with long COVID so specialized treatments can be employed, researchers said. "This is a decisive step forward in the development of valid and reliable blood testing protocols for long COVID," said David Putrino, PhD., lead author and Professor of Rehabilitation and Human Performance and Director of the Abilities Research Center at Icahn Mount Sinai Health System.

Long Covid is a new name for an old syndrome

Long Covid goes by many names. Today, it is no longer a new public health enigma, but the outlook for sufferers is no better than when the condition was first recognized in early 2020. Although its prevalence has recently decreased to 6% of the U.S. adult population, there has been no

significant progress in understanding its causes, prevention, or treatment. Long Covid still looms as the national health disaster many predicted. Everyone — patients, support groups, clinicians, researchers, and health care systems — is frustrated by lack of meaningful progress in research and patient care.

How common long COVID is may depend on how it's defined

In *Open Forum Infectious Diseases*, Dutch scientists report that the definition of post-COVID condition (PCC, or long COVID) matters when estimating prevalence in a population. In people who had previously tested positive for SARS-CoV-2, the prevalence of long-term symptoms varied from 26.9% to 64.1%, depending on which of six different definitions was used, while in those who tested negative, the prevalence varied from 11.4% to 32.5%.

Does the risk of getting long Covid increase each time you get reinfected?

More than three years into the coronavirus pandemic, fewer and fewer people are experiencing their first Covid-19 infections. But as cases climb, those who've had the virus before may wonder: What are their chances of developing long Covid — and does the risk increase with each reinfection? Fatigue and brain fog may be the first post-infection symptoms that come to mind for long Covid, but lists compiled by the Centers for Disease Control and Prevention and by the World Health Organization also include musculoskeletal pain, shortness of breath, gastrointestinal disorders, and dysautonomia, the disruptions in heart rate, blood pressure, sweating, and other functions our bodies carry out without our control. We still can't predict, prevent, or cure long Covid — or understand why it affects some people and not others.

Long COVID less likely after Omicron than other variants, data show

Researchers in Sweden report that the risk of getting long COVID after a COVID-19 infection was higher for the wild type, Alpha, and Delta variants compared to Omicron. The study is published in *The Journal of Infectious Diseases.* Though prior research has shown that severe COVID-19 is less likely from Omicron infections compared to earlier variants, less is known about how each variant increases the likelihood of developing long COVID, or persistent symptoms lasting 12 or more weeks following acute infections.

Long COVID: Mitochondria, the Big Miss, and Hope

This week there was news on Long COVID in two very different directions: the emergence of strong data to support mitochondrial dysfunction as the basis for the condition in some people, and learning how the $1.15 billion allocation to the NIH RECOVER initiative has largely been wasted. In this edition of Ground Truths, I'll review this news and offer a plan to get clinical trial testing treatments into high gear.

Sick Mitochondria as a Root Cause: When we published our review of Long COVID earlier this year, we highlighted the key established underpinnings as shown in the figure below. As you'll note, mitochondria was not one of them.