Review

Long COVID Treatment No Silver Bullets, Only a Few Bronze BBs

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Long COVID Treatment No Silver Bullets, Only a Few Bronze BBs

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Abstract

Long COVID is the consequence of having had COVID. Long COVID has many other names including Long-haul COVID, Post-COVID conditions (PCC), Post-COVID-19 syndrome, Post-acute sequelae of SARS-CoV-2 condition (PASC) and Chronic COVID. Long COVID is the name most frequently used. COVID is not alone in having severe post infection consequences. Influenza, Ebola, Marburg, Dengue, and Lyme Disease are other infections with severe post infection consequences. Long COVID has emerged over the past few years and is ill-defined. Long COVID's underlying science and treatments are rapidly evolving. There is no diagnostic test for it. The most-often reported lower bound on its prevalence is about 7%. Seven percent doesn't sound like much, but under the assumption that 75% of the people in the world have had COVID, that means 420 million people in the world have Long COVID which is about 5 times the number of people killed or injured in the 20th and 21st century wars. There are several root causes for Long COVID with inflammation and mitochondrial dysfunction being the two leading villains. Long COVID prevalence goes down with recent variants, COVID vaccination, early antiviral use, being fit, being young, and surprisingly being male. The most important action to reduce the chance of Long COVID is COVID vaccination. The impact of COVID vaccination on Long COVID prevalence is quite uncertain. Papers report 10% to 100% reduction in Long COVID rates from pre-disease vaccination. The average reported reduction is 50%. The impact of vaccination on people with no comorbidities is uncertain with wide ranges being reported. There are no guaranteed treatments for Long COVID; however, some treatments offer either broad or organ-specific relief for many. This paper reviews 179 different Long COVID treatments described in 249 papers. These papers came from the author's personal data base called *The Mouse That Roared* of 24,000+ papers that have been accumulated over the last five and a half years. *The Mouse That Roared* papers cover all aspects COVID including the SARS-CoV-2 virus, the COVID disease, therapeutics, vaccines, behavior, testing, herd immunity, Long COVID, Long COVID Treatment, Politics and National COVID responses, etc. Unlike COVID, there are no excellent treatments, which I call silver bullets, for Long COVID Fortunately, there are some treatments that help some a bit. I will call those "bronze bb's." Even with them, healing is very slow. The recovery time with Long COVID is longer than the body's normal recovery times because COVID's damage is widespread and because COVID damages our body's healing process.

Keywords: long COVID; COVID

Setting the Stage

Before discussing Long COVID treatment, a review of Long COVID is appropriate. Long COVID is very different than COVID as summarized in Table 1:

Table 1. COVID as Compared to Long COVID.

	COVID	Long COVID
Date of First Paper	February 3, 2020	July 9, 2020 JAMA – 446 citations

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	Nature – 19,000+ citations Lancet – 12,000+ citations	
What is it?	A disease caused by a virus	The multiple, diverse consequences of a disease
Contagious	Yes, very	No
Test	Yes – PCR and rapid antigen	No
% of US afflicted population	~90%	~7% of those who had COVID
Length of illness	Typically, 5-10 days	Months to years or perhaps permanent
Sex prevalence	Male	Female
Vaccination Impact	Significant reduction	No Long COVID vaccine and none is likely.
Therapeutic objective	Avoid severe disease	Repair COVID damage
Therapeutic effectiveness tests	Biochemical tests based on the therapeutic type, i.e., antiviral, anti-inflammatory, oxygenation, and blood clots.	Human trials and highly qualitative studies
Therapeutic placebo effect	Some	Can be significant

This Table Was Prepared by the Author.

Long COVID is similar to the long-term impact from other viral, bacterial and parasite diseases, e.g., Long Ebola, Long Lyme, and influenza. Table 2 summarizes some of the aspects of various diseases' post recovery conditions

Table 2. – Disease Post Recovery Impacts.

Disease / Virus	Common Long-Term Symptoms	Organs/Systems Affected	Duration	Percent Affected
COVID-19	Fatigue, brain fog, postural orthostatic tachycardia syndrome, heart palpitations, gastrointestinal issues	Brain, nerves, lungs, heart, kidney, liver, pancreas, genitals, musculoskeletal, immune system	Months to years	**~5 –15%** higher after severe cases
Epstein-Barr	Chronic fatigue, memory issues, muscle pain	Brain, immune system, liver	Months to years	**~10–15%**

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				chronic fatigue syndrome
Influenza	Fatigue, weakness, rare Guillain-Barré syndrome or encephalitis	Nervous system, lungs	Weeks to months	**~1–2%** mostly severe cases
Coxsackievirus B	Myocarditis, fatigue, chronic inflammation	Heart, muscles	Weeks to lifelong	**~5–10%**
Zika Virus	Guillain-Barré syndrome, neuropathy, fetal defects if pregnant	Nerves, brain (fetal/adult)	Weeks to lifelong	**<1%** Guillain-Barré syndrome, neuropathy **~5–10%** mild neurological symptoms
SARS / MERS	Lung damage, post-traumatic stress disorder, fatigue	Lungs, nervous system	Months to years	**~25–40%**
RSV	Wheezing, asthma in kids, chronic cough	Lungs, airway	Months to years	**~30–50%** of children with severe RSV
Measles	subacute sclerosing panencephalitis (very rare), immune suppression	Brain, immune system	Years later	Rare
Chickenpox	Shingles, nerve pain (post theraputic neuralgia)	Nerves, skin	Weeks to years	**20–30%** get shingles; **~10–15%** of those get postherpetic neuralgia

This Table Was Prepared by the Author.

COVID and Long COVID comorbidities, other than sex, are very similar. Organ-specific comorbidities, e.g., diabetes and COPD, can increase the risk to organ damage. Sadly, just like COVID, socioeconomic and political context is a Long COVID comorbidity. A particularly surprising one, as reported by Nature[1] in July 2025, is viral rebound. It increases the odds of Long COVID by about 50% whether one has taken an antiviral or not. However, just as there are more COVID papers than Long COVID papers, PubMed lists more COVID comorbidity papers than Long

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COVID comorbidity papers as shown by Figure 1 which was prepared by the author. Interestingly PubMed listed a Long COVID paper in 2019 though it was not discovered until 2020!

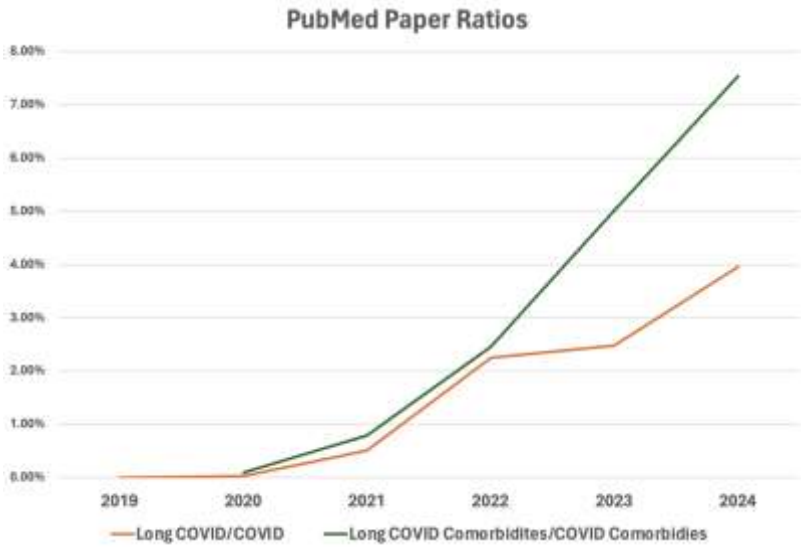

Figure 1. - Ratios of COVID/Long COVID papers in the PubMed Paper Database.

Long COVID

Figure 2 from a National Academies of Sciences, Engineering, and Medicine[2] highlights Long COVID's major symptoms. Over two hundred different symptoms have been reported in journal papers.

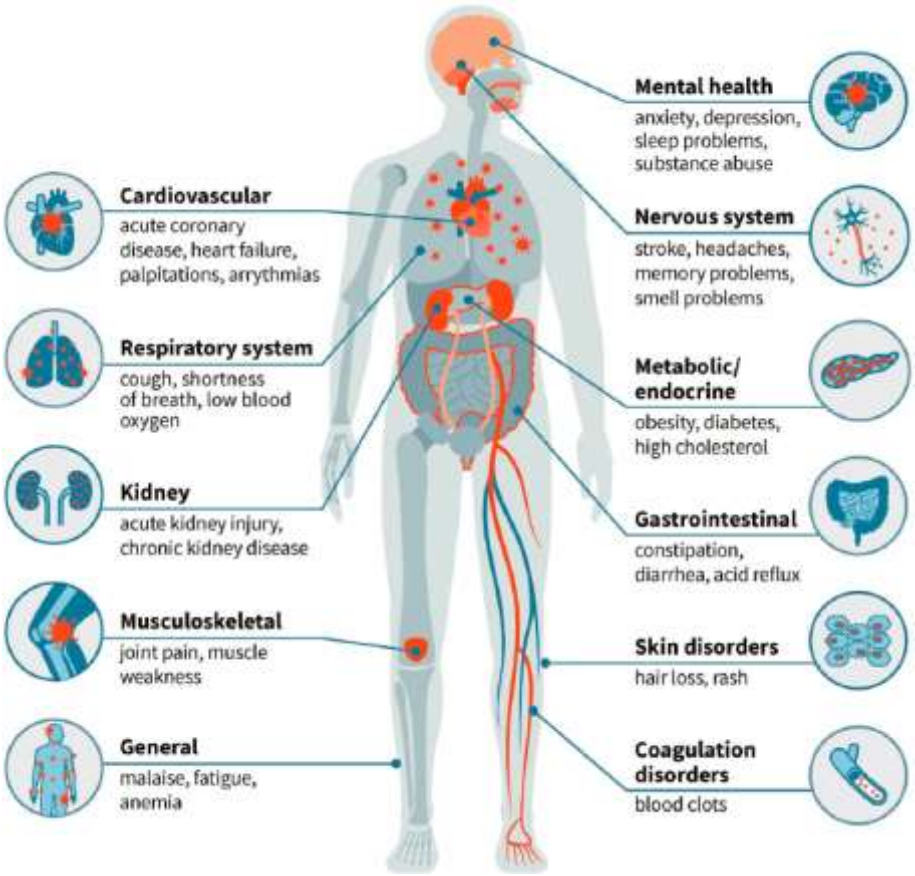

Figure 2. – Long COVID's Major Symptoms[2].

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Symptoms tend to fade with time as described by the paper *Persistence of Symptoms 15 Months since COVID-19 Diagnosis: Prevalence, Risk Factors and Residual Work Ability*, Life, December 2022.[3] However, 1-2% of people with Long COVID in the US are disabled. Getting Social Security Disability benefits is difficult because of the lack of a diagnostic test. Cardiopulmonary testing, however, could give some insight into the degree of disability. Consequently, Social Security doesn't and can't report how many people with Long COVID are getting Social Security Disability benefits.

Figure 3 summarizes the slow course of recovery. While several papers[4-8] discussed recovery times, it is from reference 4. Notice the normal recover time of a few weeks to a few months for surgeries, bone breaks, etc. Notice the difference in recovery times for hospitalized and nonhospitalized patients which is another clue on the role of COVID severity in Long COVID. Long COVID recovery time is similar to inflammatory illness such as rheumatoid arthritis, lupus, Sjogren's syndrome, Inflammatory Bowel Disease, etc. As will become clear, Long COVID is also related to inflammatory dysfunction.

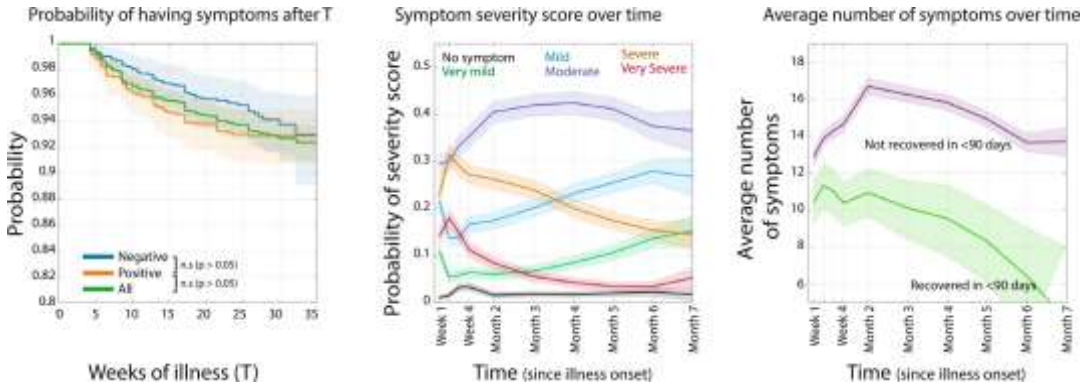
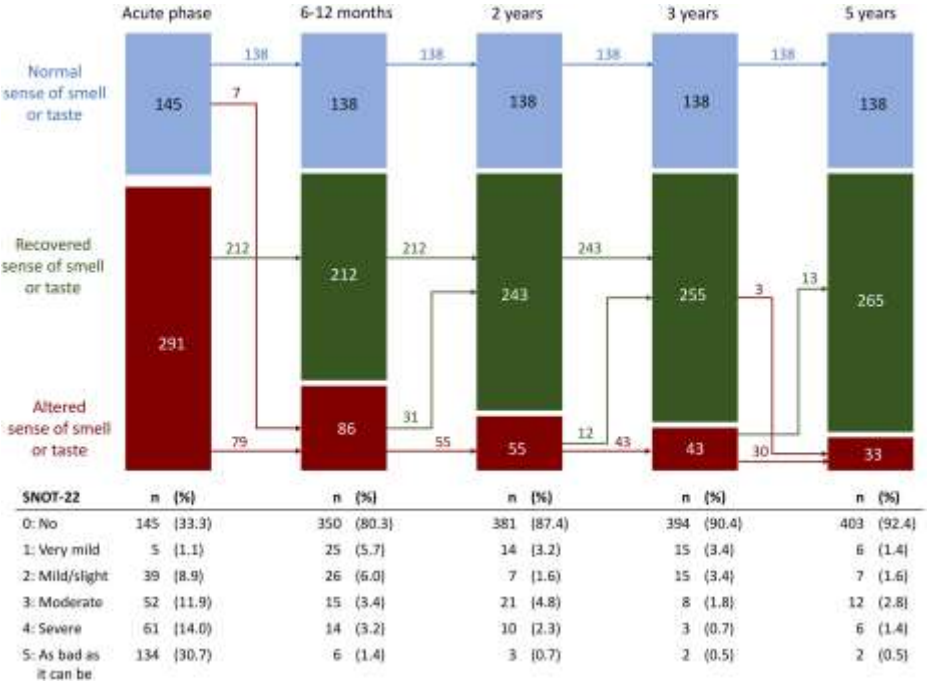


Figure 3. – Long COVID Symptom Prevalence Over Time[4-8].

Even after a mild COVD case, recovery can take a long time. A Clinical Infectious Disease paper[9] reported the recovery of smell or taste after mild COVID cases. Figure 4 summarizes the paper's results.



SNOT-22	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
0: No	145	(33.3)	350	(80.3)	381	(87.4)	394	(90.4)	403	(92.4)
1: Very mild	5	(1.1)	25	(5.7)	14	(3.2)	15	(3.4)	6	(1.4)
2: Mild/slight	39	(8.9)	26	(6.0)	7	(1.6)	15	(3.4)	7	(1.6)
3: Moderate	52	(11.9)	15	(3.4)	21	(4.8)	8	(1.8)	12	(2.8)
4: Severe	61	(14.0)	14	(3.2)	10	(2.3)	3	(0.7)	6	(1.4)
5: As bad as it can be	134	(30.7)	6	(1.4)	3	(0.7)	2	(0.5)	2	(0.5)

Figure 4. Smell or Taste Recovery Time After a Mild COVID Case[9].

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SNOT-22 is a Sino-Nasal Outcome Test

One of the reasons the recovery time with Long COVID is longer than the body's normal times is that Long COVID damages our body's healing process.[10]

There were 502 papers in *The Mouse that Roared* that addressed specific Long COVID impacts. Figure 5, which was prepared by the author, is the distribution of those papers into various categories.

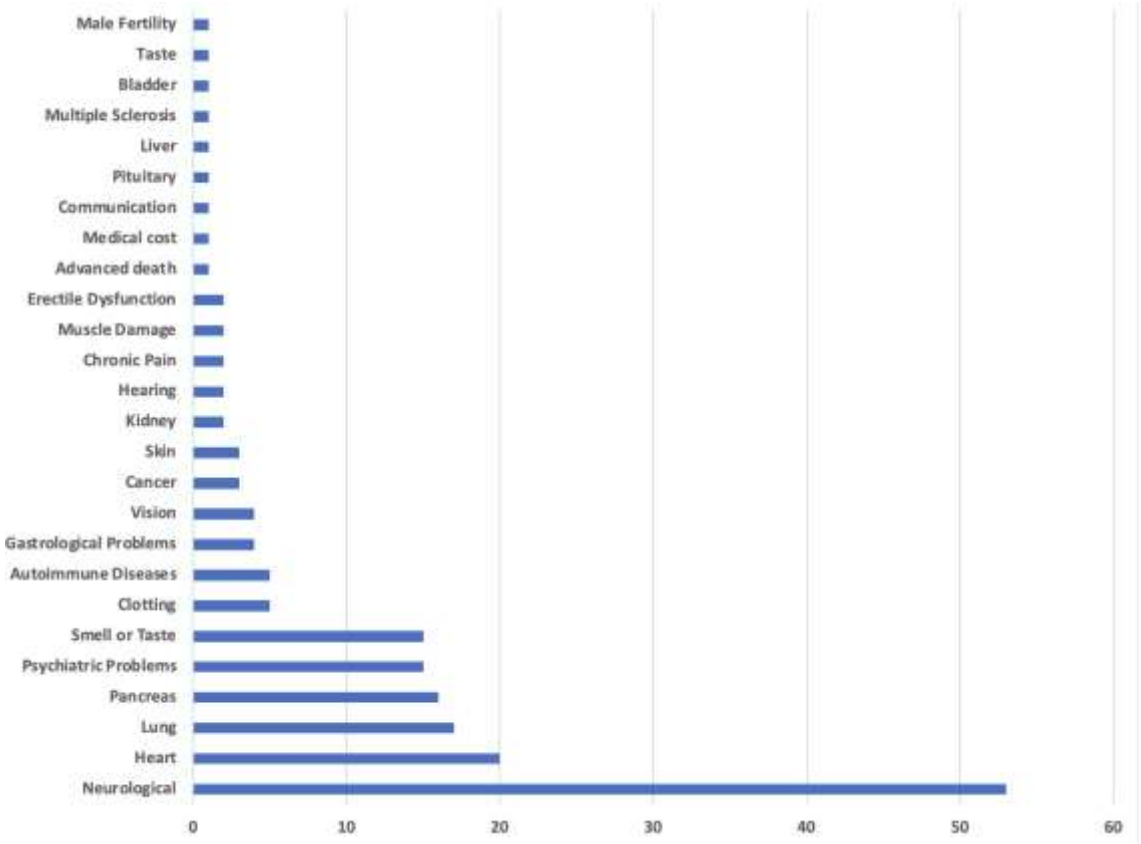

Figure 5. – Long COVID Organ Disruption Papers in *The Mouse That Roared*. The Figure Was Prepared by Author.

Not surprisingly, neurological and cardiovascular disruptions were at the top of the list as disruptions in these symptoms can lead to the two top Long COVID symptoms which are fatigue and brain fog.

Long COVID Prevalence

The following summary of CDC Pulse study[11] prepared by the author provides one view of Long COVID prevalence in the US.

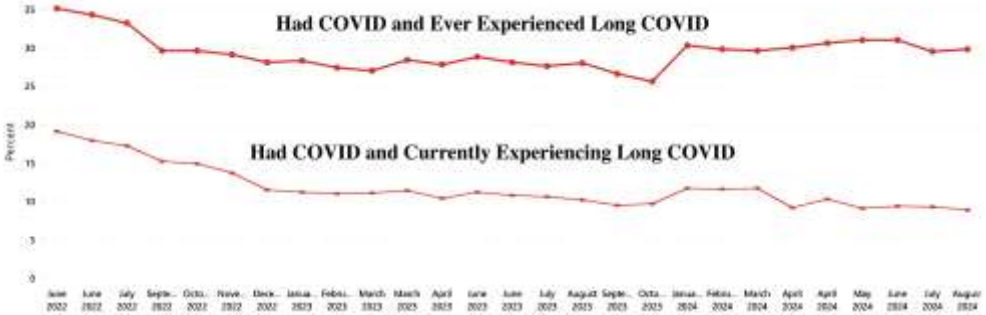

Figure 6. – US Long COVID Prevalence[11].

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The wide range of prevalence reported in *The Mouse that Roared* Long COVID papers is summarized in Figure 7, which was prepared by the author.

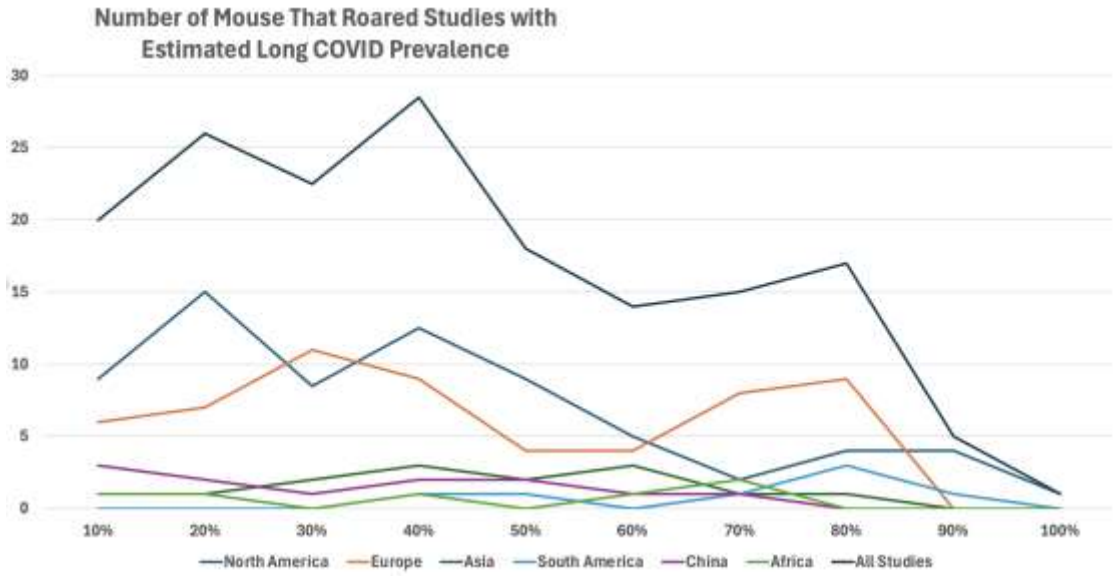

Figure 7. – Number of Papers Reporting Differing Long COVID Prevalence. This figure was prepared by the author. (The x-axis in the number of papers in each geographical region for each prevalence rate).

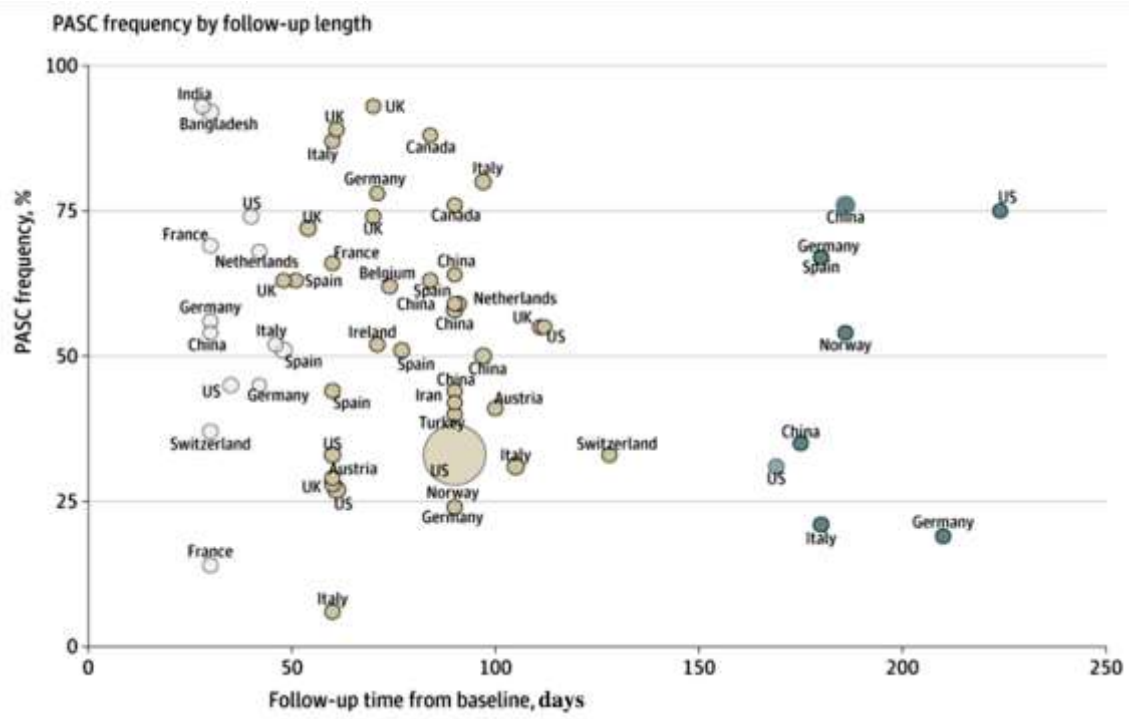

Figure 8. - Long COVID (PASC) Prevalence Versus Time[12].

Scatterplot representing each study's PASC frequency (%) plotted according to length of follow-up from baseline (in days), represented by a circle proportional to the study's sample size and annotated according to country

Prevalence by age isn't as one might expect. A 2021 Office of National Statics[13] report included Figure 9.

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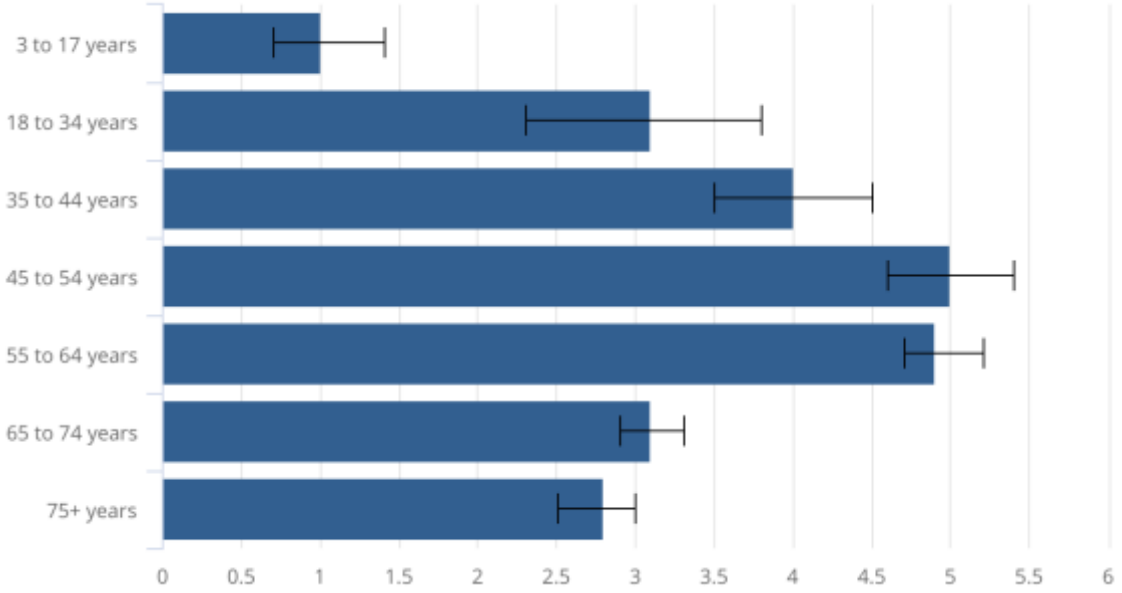

Figure 9. - Percent of People with Long COVID – March 2024[13].

In a similar vein, prevalence differs by variant and vaccination status as shown by 10 from a New England Journal of Medicine paper[14].

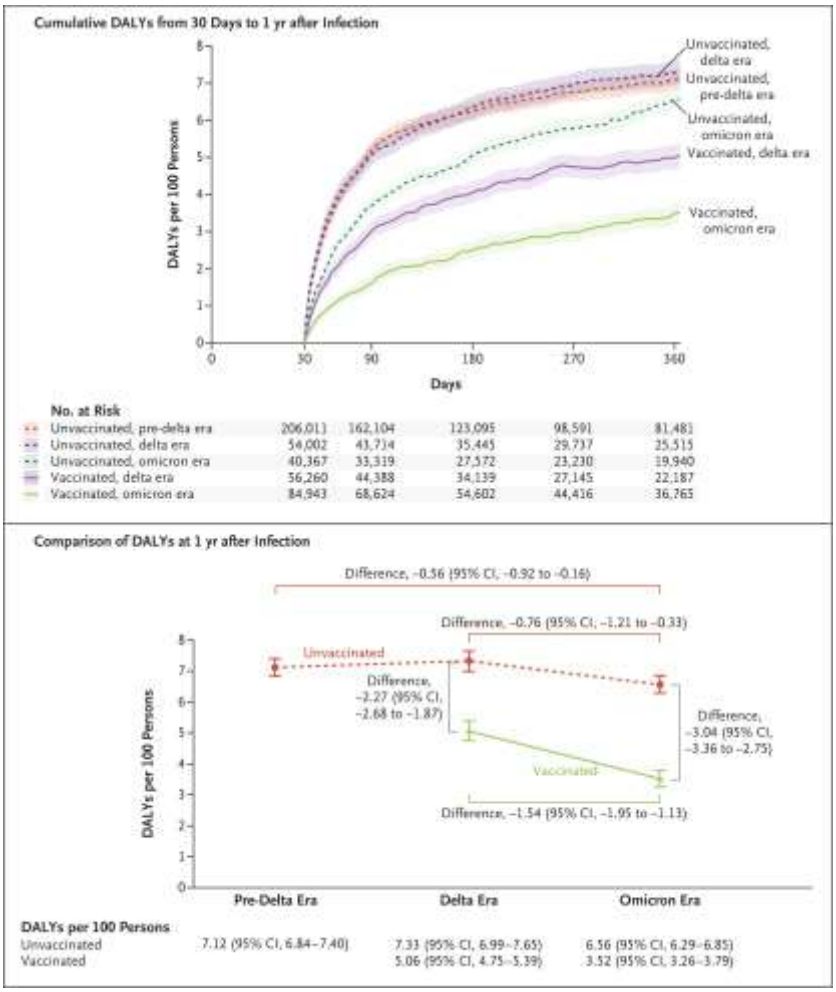

Figure 10. - Long COVID Rates by Variant and Vaccination Status[14].

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DALYs - Disability-Adjusted Life Years

In Figure 10A, the numbers at the bottom are additional DALY's as days post-infection increase. There are many reasons for this high uncertainty in prevalence.

1. First, and most importantly, there is no diagnostic test for Long COVID. Thus, assessment techniques are qualitative. For example,

i. There are self-assessments with different criteria, e.g., walk test or how are you feeling?

ii. Frequently there are not controls who also could have Long COVID symptoms, e.g., fatigue or depression.

iii. There are mail surveys, on-line forms, phone calls, all of which have low response rates. Someone who doesn't feel well is more likely to respond than someone who feels great which bias results.

iv. There are different measures such as rate, risk ratios, and fully recovered.

v. While there is a large symptom base, only a few symptoms are usually measured, usually fatigue or brain fog.

2. The pandemic changed behaviors, e.g., less exercise and sleep, which can result in one having "Long COVID" symptoms.

3. Comorbidities affect the results. The comorbidities include:

i. Pandemic medical impacts, e.g., depression which can overlap with and can exacerbate Long COVID symptoms.

ii. Age, sex, BMI, diseases, frailty, genetics

iii. Variants

iv. Therapeutics

v. COVID Vaccination

4. There are different Long COVID definitions.

Reinfection has an interesting impact on Long COVID prevalence. A May 2025, medRxiv preprint[15] reported that Estimated long COVID risk following any COVID-19 infection was similar among 22 496 online survey participants (17.0% [95%CI, 16.3%–17.6%] and 3 978 telephone survey participants (15.9% [14.6%–17.2%]. The cumulative risk increased with the number of infections, but reinfections were associated with three times lower risk of long COVID than first infections.

Of course, just like prevalence, there is great variation on reported reinfection risk. An October 2023, Open Forum Infectious Disease[16] paper reported Long COVID was reported by those ≥16 years at a rate of 4.0% of first and 2.4% of second infection, respectively. The corresponding estimates among those aged <16 years were 1.0% and 0.6%. The adjusted odds ratio for Long COVID after second compared to first infections was 0.72 for those ≥16 years and 0.93 for those <16 years. Thus, again, prevalence is complex.

Economic Impact

Based on studies from the University of Florida, the US Burera of Labor Statistics, the Social Security Administration, the Medical Expenditure Panel and other sources, The economic impact has two aspects:

1. Societal Cost
2. Personal Cost

These are the costs for the United States and Europe.

	United States	**Europe**

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Societal Cost	$170B – $230B (Wages only	€150B – €200B (Est. Total)
Personal Cost	~$9,000 (Avg)	~€7,500 (Avg)

Long COVID Root Causes

Long COVID has many root causes which are at the heart of Long COVID and the slow recovery from it. The major ones are:

1. **Inflammation**: Inflammation is probably Long COVID's major root cause. Inflammation includes recruiting white blood cells and the release of cytokines that initiate tissue swelling and injury.
2. **Persistent viral infection**: viral antigens, RNA, and SARS-CoV-2 proteins remain present and active in the body's tissues following acute infection and continue to damage it.
3. **Viral particle damage to organs**. A COVID case results in 1-30 trillion viral particles in the body. Some proteins, particularly the spike, the nucleocapsid, and the nonstructural protein 1 (nsp1) directly damage organs.
4. **Autoantibodies**: Infection with the SARS-CoV-2 virus can trigger autoimmune diseases.
5. **Biological processes and organs** are damaged.
    a. All our organs are damaged.
    b. Mitochondria, our energy workhorses, are greatly damaged by COVID. This results in fewer oxygen carrying molecules called ATP being generated for our bodies. This is a significant contributor to fatigue and brain fog.
    c. The proteins that are involved in healing are dysregulated.

Figure 11, which was prepared by the author, summaries the number of *The Mouse that Roared* papers that addressed these root cause damages.

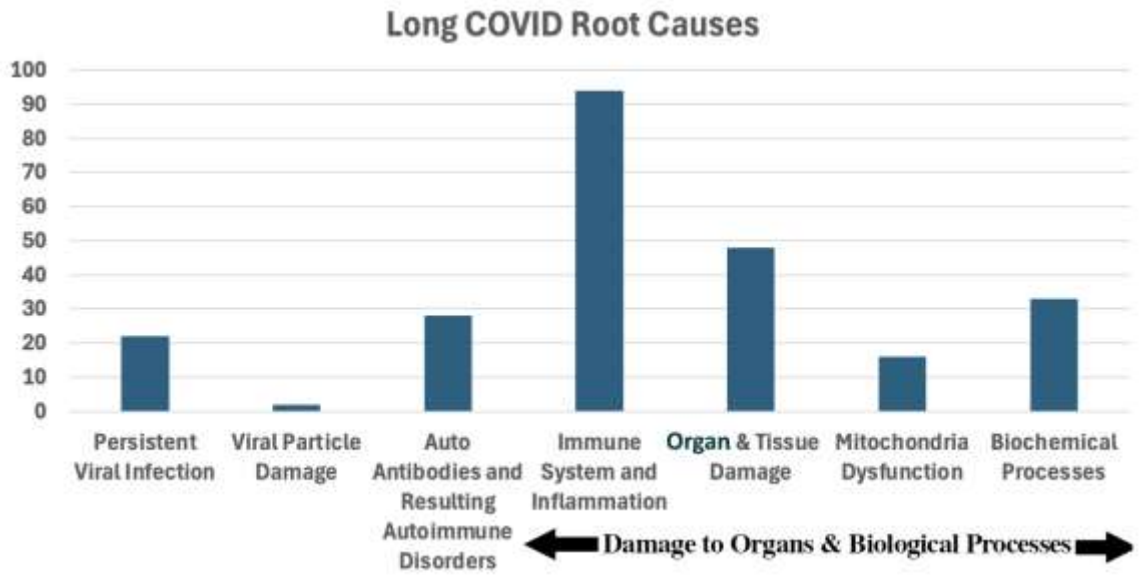

Figure 11. – Long COVID Root Causes The Figure Was Prepared by Author.

Thus, Long COVID is not a disease; rather, it is the multifaceted consequences of a disease.

Long COVID Biochemical Markers

Though there is no diagnostic test for Long COVID, there are many medical, biochemical and lifestyle markers that provide clues that Long COVID is present. They include but are not limited

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to biochemical markers for the following long list of symptoms, organs, and body characteristics. This long list is another indication of Long COVID's broad impact to the body:

- Pain
- Blood System
- Vascular System
- Retinal Microcirculation
- Musculoskeletal Changes
- Orthostatic Dysfunction
- Cardiac Changes
- Olfactory Bulb Changes
- Lung
- Diaphragm Weakness
- Gut Permeability
- Proteins
- Metabolites
- Bacteria Change
- Brain Changes
- Bacteria
- Autonomic Disfunction
- Connectivity
- Microglial And Macrophage Activation
- Brain Entropy
- Kinesiophobia
- Reaction Time
- Chemosensory Impairment
- Neurotransmitters
- Serotonin
- Protein Markers
- Plasma Changes
- Changes In Gene Expression
- Viral Proteins
- Spike Protein
- N Protein Anti-Nucleocapsid Igg
- Antibodies, Autoantibodies
- Antibody Levels
- Nasal
- Autoantibodies
- Coronavirus Imprinting
- Immune System
- Immune System Dysregulation
- Previous Coronavirus Infection
- Metabolic Changes
- T Cells dysregulation
- Monocytes
- Tryptophan & Kynurenine
- Myeloid Cells
- Mitochondria, Oxidative Stress
- Genetics
- Genes
- Epigenetic Changes

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Reducing the Chances of Long COVID

As previously noted, the chance of Long COVID increases with COVID severity. Thus, the most important action to reduce the chance of Long COVID is pre-disease COVID vaccination. The assessments of vaccine impact are further complicated by vaccine type, age, variant, whether the person is immunocompromised, etc. The following chart shows the number of COVID vaccination impact on Long COVID papers in *The Mouse that Roared*.

As illustrated by Figure 12, which was prepared by the author even something as simple as the impact of vaccination on Long COVID rates has a wide range of answers. The average is 50%, but studies reported as little as 10% and as much as 100%!

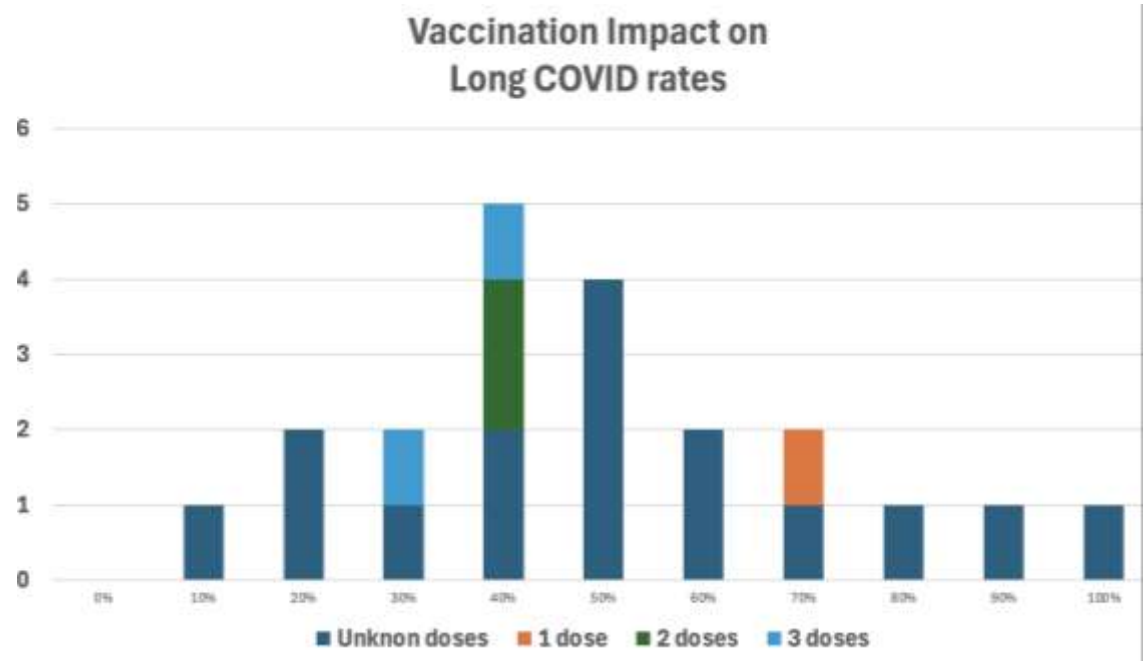

Figure 12. - Papers Reporting Impact of COVID Vaccination on Long COVID. This Figure Was Prepared by Author. The X-Axis is the number of papers for the reported reduction in Long COVID rates.

Long COVID Treatments

Vaccines and antivirals were COVID *silver bullets*. They dramatically reduce COVID prevalence and severity. Long COVID has scattered, specialized therapeutics. None are as effective as COVID vaccines or approved antivirals.

Table 3 summarizes number of Long COVID versus COVID studies in June 2025 provides some insight into the research base associated with each malady.

Table 3. – Long COVID and COVID Studies This Table Was Prepared by the Author.

	COVID Treatments	**Long COVID Treatments**
FDA clinical treatment trials	6,000	545
PubMed published papers[a]	198,000	17,000[b]
***The Mouse the Roared* papers**[a]	3,800[c]	269[d]

a. Procedures, drugs and nutrition.
b. The number of papers is likely much smaller than
c. 17,000, as many were just COVID.

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d. 14 drugs were approved by the FDA for US use.
e. None was discovered during the pandemic.
f. 179 unique Long COVID treatments.
g. None have been FDA approved for US use.

One can get further insight into the relative progress of Long COVID treatment by analyzing the FDA Long COVID clinical trials using the FDA Clinical Trial Tracker. As of June 2025, 176 of the 545 trials are in the US. While one trial can address multiple issues, Table 4 enumerates the symptoms addressed by the FDA trials:

Table 4. – Long COVID Symptoms Assessed by FDA Clinical Trials This Table Was Prepared by the Author.

Symptom	FDA Clinical Trial
Fatigue	279
Mental Health	138
Persistent Infection	106
Inflammation	66
Brain Fog	63
Antiviral	51
Gut Micro biodome	16
Microclotting	14
Cognitive Behavioral Therapy to Treat It	12
SSRI Antidepressants to Treat It	12
Auto Immune Diseases	12
Mitochondrial	11
Dementia	10

As of June 2025, no Long COVID clinical trial had posted clinical results. However, it is important to note that many Long COVID symptoms such as blood clots have approved therapeutics.

Sadly, as shown in Table 5, the Long COVID FDA trial rate decreased in 2024 and 2025.

Table 5. – Long COVID FDA Clinical Trials This Table Was Prepared by the Author.

Year	Long COVID Trials Started
Pre 2020	2[a]
2020	43
2021	120
2022	142
2023	155
2024	83
2025 - through 8/31	57

a. This number demonstrates the frailty of the FDA clinical trial search program. One of the two studies was 2018. The other study said Long COVID, though Long COVID didn't appear until mid 2020.

Nonetheless, there is good reason to hope that progress will be made on Long COVID treatment.

1. The scientific community is early in focusing on Long COVID, so clearly other treatments will be discovered.

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2. The huge, order of $2.3 billion, US Long COVID project called Recover Project is just gathering momentum. This will be a long term, well-funded project if for no other reason than the order of 20 million Americans suffers from Long COVID. This website lists its published papers Recover Project Published Papers.
3. Though not as large as the US Recover Project, many countries have large Long COVID projects including, but not limited to the UK, Canada, Australia, China, Japan, South Korea, the European Union, and the Word Health Organization.
4. That is, the number of Long COVID treatment papers in *The Mouse That Roared* dropped precipitously in July and august 2025.

Treatment Strategy

This section will outline the approach one might wish to follow if one believes he/she has Long COVID.

I. Get the Right Set of Doctors

If the impact is focused, e.g., arrythmias, orthostatic hypotension, or loss of smell, then seeing an expert in that illness, ***who is also expert*** in Long COVID, is the right approach**.** If the impact is broad, one should pursue broad, Long COVID care.

II. Go to a Long COVID Clinic

A May 2024, BMC Health Services Research[17] paper noted that the economic and health burden of COVID-19 has transformed the healthcare system in the US. Hospitals have adapted to the heterogeneity in Long COVID symptoms and the sheer number of people affected by this condition by building Long COVID centers and programs.

43 out of 50 of the top hospitals in the US offer Long COVID treatment services. The most common specialties were psychology (n = 25; 58%), neurology (n = 25; 58%), and pulmonary (n = 24; 56%). Sixty-three trials of the 134 Long COVID clinical trials had at least one top hospital listed as a study site.

Thus, if the impact is broad-based, e.g., brain fog and fatigue**,** one will likely need to see multiple doctors, e.g., a pulmonologist and a rheumatologist (for the inflammatory nature of the condition) at a **Long COVID clinic** depending on where you live. Johns Hopkins would be a great place to go if you live near Baltimore. It has a well-established Long COVID program. Johns Hopkins Long COVID Program

The Long COVID Clinics website lists 412 Long COVID Clinics. Be sure to go to one associated with one of the top hospitals. Some of the Long COVID Clinics listed on the website only provide specialized treatments such an oxygen chamber.

Starting in 2020, the Veterans Health Administration (VHA), established a national network of Long COVID Clinics (LCCs). A Health Affairs Scholar paper[18] reported a retrospective cohort study of 494,547 veterans with documented SARS-CoV-2 infection from March 2020 to April 2022. Researchers examined trends in the U09.9 ICD-10 diagnosis code used for Long COVID in the VHA up to May 2024. Overall, 5.9% (n=29,195) of patients in the cohort had a documented U09.9 code and 2% had at least one LCC visit. Among Veterans with a U09.9 code, 17.4% used LCCs. LCC use rates were low across all patient subgroups. LCCs were more available to Veterans residing in the South Census region than Veterans in other regions.

In June 2025 the World Health Organization issued guidelines for COVID and Post COVID[9]

World Health Organization COVID and Post COVID Guidelines

U.S. Department of Health and Human Services Actions

In September 2023, the U.S. Department of Health and Human Services allocated major funding to 12 Long COVID clinics across the country.

The Long COVID Alliance is another good LONG COVID resource for understanding LONG COVID research and patience support

III. Consider Having Assessments for Root Causes

As previously discussed, there are several root causes for Long COVID. It could be worth getting tested for them to help guide treatment.

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1. **Persistent Inflammation** The main test for inflammation is for the IL-6 cytokine. Persistent Inflammation Test describes the test. Inflammation is probably the most important test as hyperinflammation is a leading cause of severe COVID which leads to the most severe cases of Long COVID.

2. Mitochondrial Dysfunction This is probably the second most important test. Initial laboratory tests such as lactate, pyruvate, urine organic acids, and plasma amino acids can inform the clinician about possible mitochondrial dysfunction.

3. **Persistent Infection** The main tests are:
   i. Antibody Testing: Persistence of IgM or high IgG titers might indicate ongoing antigen exposure.
   ii. T-cell Activation Profiles: Specialized tests can assess T-cell responses to SARS-CoV-2 antigens, indicating ongoing immune activity against the virus.
4. **Autoantibodies** Testing for autoantibodies triggered by COVID-19 involves specialized laboratory assays that detect the presence of antibodies targeting the body's own tissues. They are several types.
   i. Blood Tests to Detect Specific Autoantibodies
      a. Enzyme-Linked Immunosorbent Assay (ELISA): It is used to detect autoantibodies such as anti-nuclear antibodies (ANA), antiphospholipid antibodies, and others.
      b. Indirect Immunofluorescence: It is often used for detecting ANA or anti-neutrophil cytoplasmic antibodies (ANCA).
      c. Multiplex Autoantibody Panels: These are comprehensive tests that simultaneously evaluate multiple autoantibodies associated with autoimmune diseases.
   ii. Functional Assays
      a. Neutralization Assays: These check for autoantibodies interfering with normal immune pathways, such as those targeting type I interferons which is linked to severe COVID-19.
      b. Complement Activity Assays: These evaluate the activity of autoantibodies against the complement system.
   iii. Tissue-Specific Tests
      a. Thyroid Function Tests: If autoimmune thyroiditis is suspected, specific antibodies like TPOAb (thyroid peroxidase) can be tested.
      b. Liver Function-Related Autoantibodies: For autoimmune hepatitis, testing for anti-LKM1 or ANA might be necessary.
   iv. Specialized Tests for COVID-19-Triggered Autoimmunity
      a. Anti-Interferon Autoantibody Testing: This is relevant for severe COVID-19 cases as these autoantibodies may impair the immune response to the virus.
      b. Anti-Phospholipid Antibodies (aPL): Increased risk of blood clots in some COVID-19 cases can be linked to these autoantibodies.
      c. Cytokine Autoantibodies: These assess disruption in immune signaling pathways, especially in post-COVID syndromes.

5. Gut microdome dysfunction – there are many tests.

IV. Summarize Relevant Personal Medical Data

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Prepare a summary of your relevant health data. Include:

1. Pre-existing health issues being sure to include any autoimmune disease and other COVID comorbidities such as diabetes, active cancer treatment, etc. This is important because as noted above, organ-specific comorbidities can increase the risk of COVID-caused organ damage.
2. COVID case data, including COVID dates, tests, severity, and therapeutics.
3. COVID vaccination history.
4. Long COVID history - start date, symptom trends, and treatments. As shown in Figure 13, the California Department of Health's Post COVID Symptoms Log is an excellent way to summarize one's Long COVID symptom data.

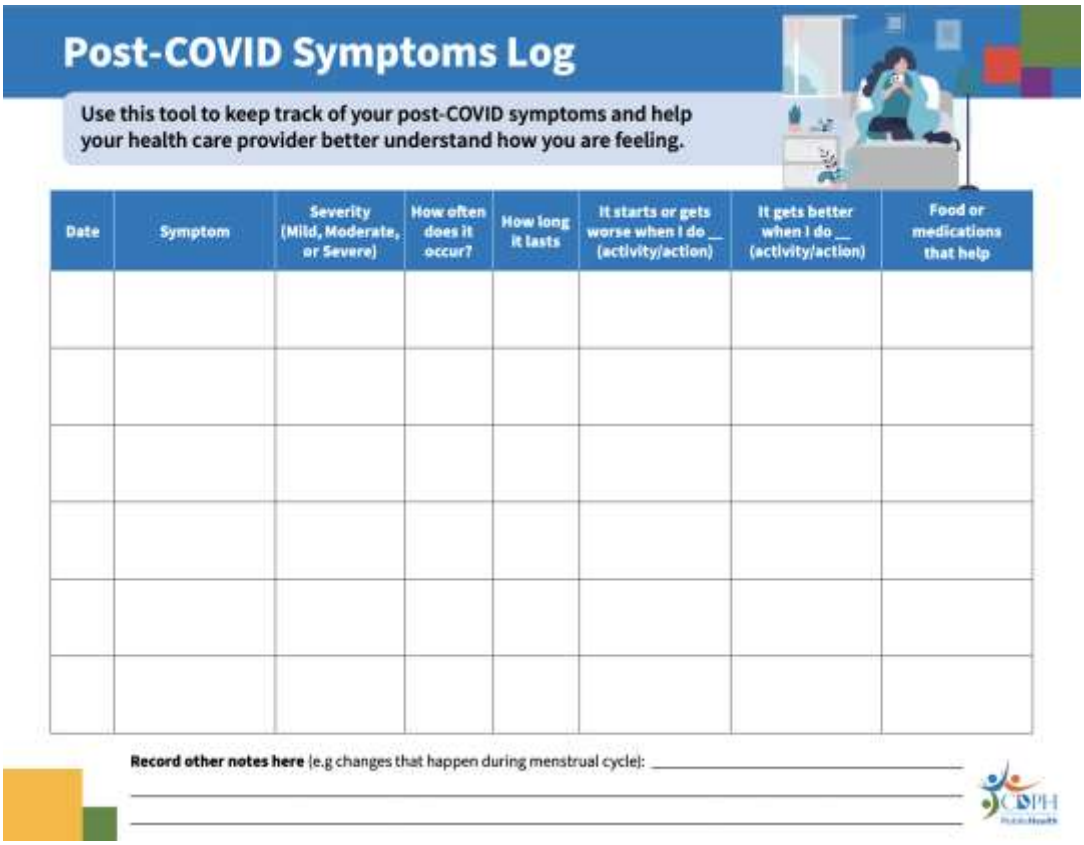

Figure 13. – Post COVID Symptoms Log from the Clevland Clinic.

V. Discuss Candidate Treatments

In going to the Long COVID Clinic, it is worthwhile having an idea of potential treatments. You might wish to discuss them with the doctors at the Long COVID Clinic.

Figure 14, which was prepared by the author, graphs the types of Long COVID treatment papers from *The Mouse That Roared* versus time.

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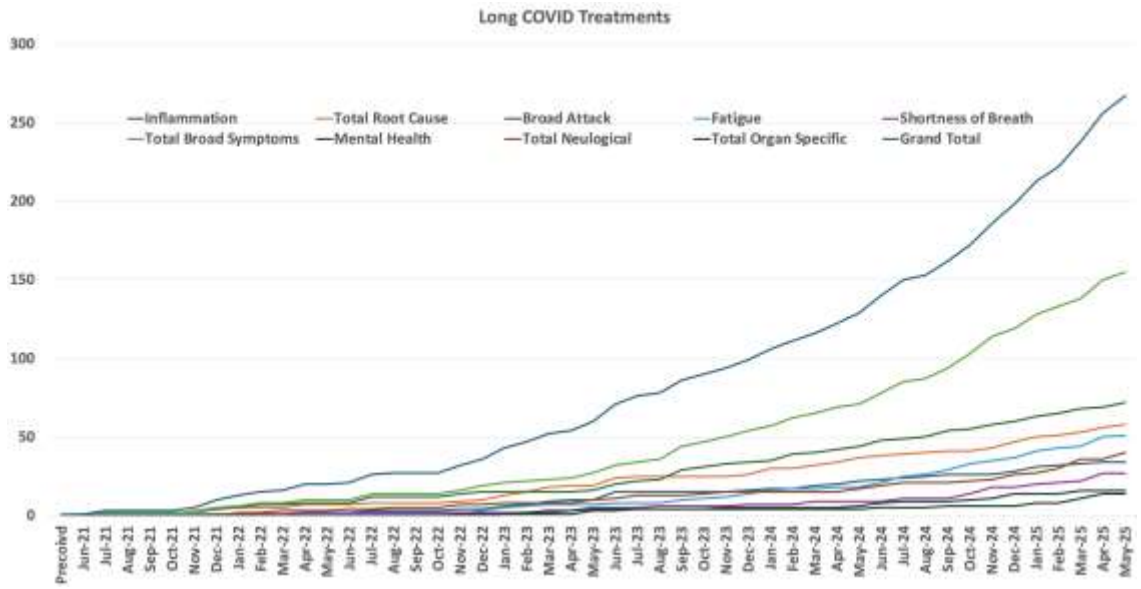

Figure 14. - Types of Long COVID Treatments The Figure Was Prepared by the Author.

Three points regarding the chart:

1. Most of the root cause papers address inflammation.
2. The choice of assigning a paper to Broad Symptoms or Root Cause/Inflammation was a bit arbitrary and was often based on the way the paper's data was presented.
3. Notice how few organ-specific papers were written. This is not surprising as treating arrythmia, for example, induced by Long COVID is likely little different than treating non-COVID arrythmias.

The tables in appendix 1 summarizes the distinct treatments and the total number of papers, including the number of cases reported in the papers as of June 2025. Other more recent papers are included in the later discussion. As of the June 2025 analysis, there were 269 papers covering 168 distinct treatments.

Of them:

1. Only 70 papers reported total human trial sizes of 100 or more. This would be the minimum size for an FDA phase 2 trial which determines a treatment's effectiveness. Only 27 papers reported studies of 300 or more humans in their trials.
2. If one combines trials into the group that had the largest number of people in one trial, then exercise studies accounted for more than 10% of the papers.

Control groups are always important in assessing treatment effectiveness. For Long COVID treatment, this is particularly important given the natural wanning of symptoms, the lack of a diagnostic test, and the subjectiveness of Long COVID assessment. Nonetheless, as shown by a table in Appendix 2**, 69% of the trials had no control group.**

Astoundingly, the papers that explicitly addressed root causes didn't have trials. However, other papers which had trials discussed therapies that addressed the root causes including

1. Corticosteroids - prednisone or dexamethasone
2. Colchicine
3. Low-Dose Naltrexone
4. Antihistamines and Mast Cell Stabilizers
5. Statins - atorvastatin, rosuvastatin
6. Omega-3 fatty acids
7. Palmitoylethanolamide

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8. Curcumin
9. Resveratrol
10. Q10

Mitochondrial dysfunction is a major root cause. It is associated with sleepiness which can be related to fatigue[20]. A July 2025, Nature paper[21] reported that mitochondria were important for T cell functioning. A May 2024, Nature paper[22] discussed mechanisms and advances in therapies for mitochondrial dysfunction. As can been seen from Figure 15 from the paper, interest in mitochondrial dysfunction has dramatically grown in the last two decades.

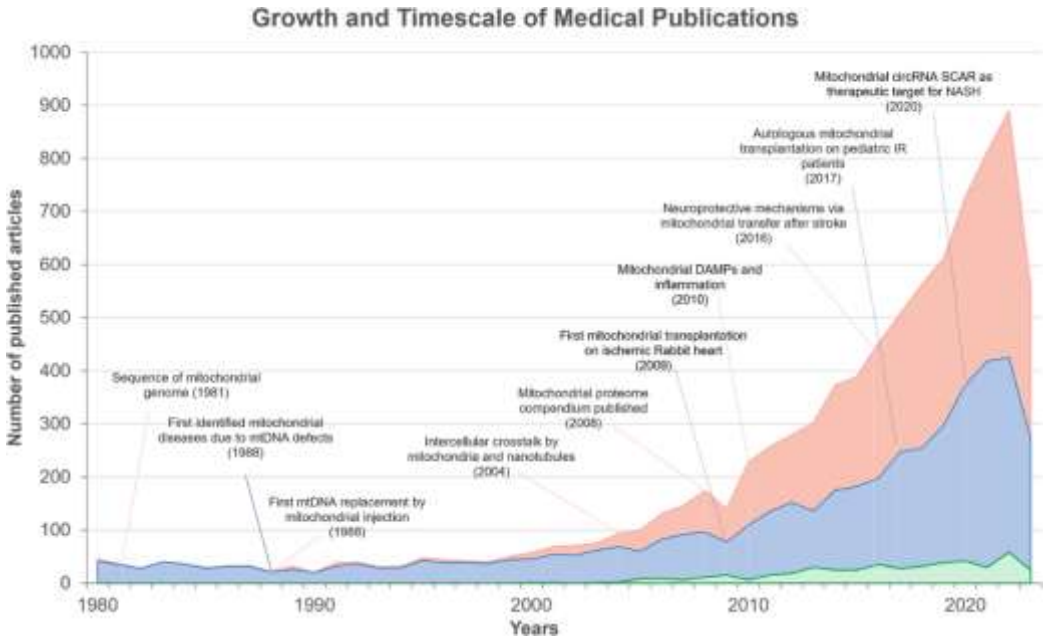

Figure 15. - Medical Papers on Mitochondrial Dysfunction[22].

The paper reported that notable interventions included: exercise protocols to promote the expression of peroxisome proliferator-activated receptor-gamma coactivator-1 alpha (PGC-1α), dietary supplements to target primary nutrient deficiency, nicotinamide riboside (NR) to augment nicotinamide adenine dinucleotide (NAD) biosynthesis MitoQ for neutralizing mitochondria-derived reactive oxygen species (ROS) the global antioxidant Coenzyme Q10 (CoQ10) N-acetyl cysteine (NAC) and the mitochondrial inhibitor ME-344 (known for its anti-tumor properties). As you will see, many of these treatments were included in Long COVID Treatment Trials.

Trial Sizes for FDA Drug Assessment

In assessing the trials, this is what the FDA considers appropriate for trial sizes:

Phase 1: Safety and dosage

Size: Small, typically 20 to 100 participants who are healthy volunteers or individuals with the disease being studied, depending on the drug.

Purpose: To determine if the drug is safe and well-tolerated, establish the best way to administer the drug, and identify initial dosage range and potential side effects.

Key points: Researchers start with low doses and gradually increase them, carefully monitoring for side effects and drug interactions.

Phase 2: Efficacy and side effects

Size: Typically, from 100 to several hundred participants with the specific disease or condition the drug is intended to treat.

Purpose: To evaluate the drug's effectiveness against the target disease or condition, continue monitoring for safety, and identify any short-term adverse reactions or risks associated with the treatment.

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Key points: May involve comparisons with placebo or existing standard treatments, according to the American Cancer Society.

Phase 3: Confirming efficacy and safety

Size: Typically involving hundreds to thousands of participants with the disease or condition across multiple locations, potentially worldwide. While no minimum is specified, the trials normal range from 300 to 3,000 participants. Control groups are always included.

Purpose: To confirm the drug's effectiveness and safety in a larger population, compare it to standard treatments, and collect more data on long-term effects and rare side effects.

Key Points: They are very expensive. A phase 3 vaccine trial costs about $100 million.

Thus, we shall summarize the treatments in four buckets based on the number of people in the treatment trial – 300+, 100-299, 1-99 and none. While these were formal FDA drug trials, one has a qualitative sense of confidence in the trial's result based on its size.

Only two treatments – exercise and oxygenation – had a significant number of papers – exercise 27 and oxygenation 18. After that, as summarized in Table 6, they dropped off quickly to:

Table 6. – Number of Papers Describing a Treatment This Table Was Prepared by the Author.

Number of papers describing a treatment	Number of treatments
6	1
5	1
4	1
3	6
2	18
1	**107**

I shall now discuss each of treatments. Treatments that lead to broad improvements generally attacked the underlying causes for Long COVID such as inflammation and/or microconidia damage. Those that address specific symptoms such as smell typically addressed a specific organ. A treatment could be a procedure (e.g., exercise), a drug (e.g., aspirin), or nutrition (e.g., probiotics.)

Procedures

At Least One 300+ Trial

Broad Improvements

Exercise[23-60]

Exercise can reduce Long COVID symptoms by:

1. Reducing inflammation.
2. Stimulating mitochondrial biogenesis and improve ATP production, which can reduce fatigue.
3. Improving vascular tone, oxygen delivery, and tissue perfusion, potentially easing symptoms like brain fog or muscle aches.
4. Rebalancing the autonomic nervous system through designed recumbent or supine exercise (e.g., rowing, swimming, recumbent cycling) which may help recondition the cardiovascular system and reduce orthostatic symptoms.
5. Promoting neuroplasticity, potentially helping with cognitive symptoms (e.g., brain fog).
6. Promoting lymphatic flow and helping clear cellular debris and immune complexes.
7. Support fluid and waste clearance in the brain, helping with cognitive symptoms and sleep quality.

The trick is not to over exercise which can exacerbate symptoms.

Oxygenation[61-79]

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There were many ways to increase oxygen in the body, either through direct oxygen or specialized breathing programs. Oxygenation helps reduce Long COVID symptoms by:

1. Significantly increasing the amount of oxygen dissolved in the blood plasma, allowing more oxygen to reach tissues that may be oxygen-deprived or poorly cleared of fluids.
2. Helping to reduce inflammation immune response.
3. Promoting a more balanced immune function.
4. Improving mitochondrial function, potentially increasing ATP production, reducing mitochondrial apoptosis signaling, and reducing oxidative stress. This leads to a boost in energy production and reduced fatigue.
5. Stimulating the growth of new neurons and improved neuroplasticity thereby potentially improving cognitive function.

Improving Mental Health[80-82]

Therapy and drugs improved mental health. Other therapies like exercise and oxygenation also improved mental health. Improving mental health reduces Long COVID symptoms by:

1. Reducing chronic stress which increases inflammatory cytokines which are already elevated in Long COVID.
2. Improving mood and symptom perception which may help people feel better, even if the underlying pathology remains.
3. Improving sleep quality which can significantly reduce daily symptom burden and improve mitochondrial function.
4. Regulating the autonomic nervous system which is linked to fatigue, and breathlessness.
5. Improving cognitive function which can help cope with brain fog and develop compensatory strategies, even if they don't reverse the cause.

SPA & Hot Spring Bathing[83-84]

There were broad improvements since hot water can reduce inflammation and sooth pain.

Speleotherapy[85]

There was no improvement in sense of smell

Dual Antiplatelet Therapy[86-88]

There was major improvement in fatigue, cognitive dysfunction, shortness of breath, and joint and muscle pains.

Drugs

Broad Improvements

SSRI Inhibitors[89-91]

2/3 reported improved overall symptoms.

Brexpiprazole + sertraline[92]

2/3 reported reduced PTSD symptoms

Rivaroxaban[93-94]

It reduced new atrial fibrillation as well as incidence of sudden cardiac death.

P2Y12 Inhibitor[95]

There was improved quality of life at 90 days.

Prospekta[96]

It led to significant, broad improvement.

Ensitrelvir[97]

It improved smell and taste by 39%.

Electrolyte Supplementation[98-99]

It improved biochemicals and heart parameters.

Oral Zinc[100]

It interfered with improvement

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Traditional Chinese Medicine[101-102]

It improved chest tightness and insomnia

Cyclobenzaprine Hydrochloride[103]

It improved fatigue and sleep

SIM01 - Gut Microbiota-Derived Formula[104]

Fatigue, memory loss, difficulty in concentration, gastrointestinal upset and general unwellness were all alleviated.

Transcutaneous Nicotine[105]

73.5% of patients reported a significant improvement in the symptoms.

COVID Vaccination Post Long COVID[106]

A discussed earlier, COVID vaccination reduces the chances of Long COVID and even if Long COVID emerges, it reduces its severity. However, the results from the post COVID vaccination papers were uneven and contradictory.

Nutrition

Broad Improvement

Salmon Oil[107-108]

It provided broad inflammation-resolving effects

Mediterranean Diet[109]

It led to better health markers linked to significant improvements in inflammatory and oxidative stress markers.

Homeopathy[110-111]

There was a decrease in symptoms

Trials with 100-299 patients

Weight Loss[112]

There were broad improvements.

Yoga[113-114]

There were significant reductions in levels of perceived stress, anxiety, and insomnia

Pressing Needle Therapy[115]

It improved mental health and sleep quality.

Speech Language Hearing Therapy[116]

It improved swallowing but less so in in those who were frail.

Olfactory Training[117-122]

There were mixed results on whether it helped improve sense of smell and taste.

Drugs

Corticosteroids[123-127]

Patients who received oral dexamethasone for hospitalized COVID-19 were less likely to experience persistent symptoms at 8-month follow-up.

Vortioxetine[128]

There were broad improvements.

Donepezil[129]

There were broad improvements.

Coenzyme Q10[130-133]

There was little improvement

RSLV-132 - catalytically active human RNase1 fused to human IgG1 Fc[134]

There was no long term improvement.

Deupirfenidone[135]

It improved the 6-min walk times.

Organ Specific Improvement

Mesenchymal Stem Cell[136-137]

17.9% in treatment group had normal lung CT images at month 12, but none in the placebo group.

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Fuzheng Huayu[138]
The traditional Chinese medicine led to minor improvement in some measures.
Temelimab[139]
It showed no improvement.
Nutrition
Broad Improvement
Bufei Huoxue[140]
It reduced fatigue.
Ficus pumila L. extract[141]
It reduced insulin in diabetic patients.
Apportal[142]
There was broad improvement.
Vitamin K/D3[142]
There was some improvement, particularly in inflammation.
Pycnogenol[144]
It did not improve health status compared to placebo over 12 weeks.
Echinacea angustifolia, rosehip, propolis, royal jelly and zinc[145]
It reduced fatigue.
Table 7 summarizes the treatments from the smaller human trials.

Table 7. – Moderate Sized Trials.

Procedures		
Trial Size	Treatment	Improvement
50-99	Fecal Transplant[146]	Sleep
	Enhanced External Counter Pulsation[147]	Broad
	Spinal Cord Transcutaneous Stimulation & Respiratory Training[148]	Lung Fatigue And Concentration
	Digital Cognitive Training[149]	Broad
	Unified Phycological Protocol[150]	Broad
	Wearable Brain Activity Sensing Device[151]	
	Trained With Orange, Lavender, Clove And Peppermint Oils[152-3]	Broad Impact Broad Impact
	Contracting And Relaxing Pneumatic Cuffs 0n The Calves, Thighs, And Lower Hip[154]	
25-49	Immunoadsorption[155]	Broad
	Vagus Nerve Stimulation[156-158]	Broad Neurological
	Transcutaneous Electrical Nerve Stimulation[159-161]	Pain And Fatigue
	Tragus Nerve Stimulation[162-163]	Broad
	Matt Pilates[164]	Fatigue
	Photobiomodulation[165-166]	Pain And Fatigue
	Stellate Ganglion Block[167-171]	Smell And Broad
	Ropinirole[172]	Restless Leg Syndrome
	Acupuncture[173]	Well Tolerated, No Measures On Outcomes
	Expectation Management[174]	Minor Broad

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10-24	Dance[175] Aripiprazole[176] Continuous Positive Airway Pressure[177] Olfactory Training With Vitamin A[178] Functional Septorhinoplasty[179] Virtual Reality Training[180] Neuromodulation[181]	Broad Reduced sleep duration Cognition No Impact Smell No Impact No Apparent Impact
1-9	Oronasal Drainage[182] Plasmapheresis[183-184] Light To Restore Circadian Rhythm[185] Neural Feedback[186] Plasma Exchange Therapy[187]	Broad Cognition Sleep More Alert No Impact
Drugs		
Trial Size	Treatment	Improvement
50-99	Leronlimab[188] Sea Urchin Eggs[189] Co-UltraPEALut[190] Naltrexone[191-193] Antihistamines[194-195] Amantadine[196] Propranolol[197] Lithium[198] Metoprolol[199] Rintatolimod[200] Gabapentin[201]	Inflammation Pain Memory & Fatigue Broad & Tremors Broad But Uneven Fatigue Orthostatic Hypotension No Improvement Cardiovascular No Impact No Impact
25-49	Valtrex + Celecoxib[202] AXA1125[203] Plasma[204-205] Treamid[206] Palmitoylethanolamide Co-Ultramicronized With Luteolin[207-208] Phosphatidylcholine[209] Aripiprazole[210] Hochuekkito[211]	Broad Fatigue Smell Improved Lung Capacity Improved Smell Improved Inconclusive Reduced Sleep Needs Reduced Fatigue
10-24	Creatine[212]	Fatigue
1-9	Casirivimab/Imdevimab[213] Nicotine Patch[214]	Complete Remission Broad And Major Broad Broad Cognition Orthostatic Hypotension

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	Bupropion[215] Methylphenidate[216] Guanfacine[217] Intravascular Immunoglobulin Therapy[218] Ivabradine[219] Minocycline[220] Epipharyngeal Abrasive Therapy[221]	Orthostatic Hypotension Orthostatic Hypotension Cleared Viral RNA
Nutrients		
Trial Size	Treatment	Improvement
50-99	Nutritional Supplements Plus Exercise222 Ayurveda System Of Medicine[223] Astragalus Root Extract[224] Marine Oils[225] Endocalyx[226] Glycocalyx Dietary Supplement[227]	Broad Diarrhea And Broad Fatigue Fatigue Cardiovascular Cardiovascular
25-49	Beet Juice[228-229] Probiotics[230-231] Maraviroc And Pravastatin[232]	Fatigue And Sleep Inflammation Broad
10-24	Salmon Oil[233] Tinospora Cordifolia[234]	Inflammation Inflammation

Naltrexone is of unusual interest. Several review papers highlighted it as an important treatment though there were no large studies justifying their recommendations. Naltrexone is approved by the Food and Drug Administration (FDA) to treat both opioid use disorder (OUD) and alcohol use disorder (AUD).

Table 8 lists treatments that had no human trials

Table 8. – No Human Trials.

Procedures		
Infrared light[235]	Cell cultures	Two ten minute exposures led to 80% IL-6 reduction in gene assay.
Hyperthermia[236]	Review/ hypothosis	Modulates necroinflammation.
Drugs		
Tocilizumab[237]	Trial underway	Reduce inflammation
Baricitinib[238]	Trial underway	Reduce inflammation

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Peptide LTI-2355[239]	Cell cultures	Mitigated inflammation in the respiratory tract.
CB2R agonists[240]	Hypothosis	Reduce inflammation
Ginkgolide B-loaded lubosomes And vesicular LNPS[241]	Human cell cultures	May protect against cell death
SPIKENET, SPK[242]	Mice	Reversed the development of severe inflammation, oxidative stress, tissue edema, and animal death. Recall, vaccines in humans didn't help.
Fermentable fiber[243]	Hypothesis	Reduce autoantibodies
Polyphenols[244]	Hypothesis	Reduce autoantibodies
Resveratrol[245]	Hypothesis	Reduce gut microdome dysfunction
Boost nicotinamide adenine dinucleotide (NAD+)[246]	Hypothesis	Reduce gut microdome dysfunction
Gamunex-C[247]	Proposed trial	Broad relief
Paracetamol and Dexketoprofen Trometamol[248]	Analytic technique	Broad relief when administered with rivaroxaban
Modafinil[249]	Literature search	Broad relief
Kyungok-go[250]	Proposed trial	Broad relief
Cyclobenzapring Hydochloride[251]	Company annoucement	Reduce pain and improved sleep
Ivabradine and midodrine[252]	Review of 32 studies	Reduced brain fog
Omega-3 fatty acids[252]	Review	Improve mental health

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Aspartate or Asparagine[253-254]	Hypothosis	Improve vision
Macitentan[255]	Hamsters	Restored bone loss
Tanshinone IIA[256]	Chemical evaluation	Inflammation
Epigallocatechin-3-gallate-palmitate[257]	Cell culture	Neurological
Tuning Organelle Balance In Human Mesenchymal Stem Cell[258]	Cell Study	Major mitochondrial production
L-carnitine[259]	Theory	Fatigue
Niclosamide[260]	Review	Broad
Larazotide[261]	Proposed trial	Broad
Ecstasy[262]	FDA Vote	Too risky
Sodium Pyruvate Nasal Spray[263]	Proposed trial of drug useful in flu	Broad
Nutrients		
Korean Herbs[264]	Mice cell cultures	Decreased nitrous oxide levels in some cell types.
Melatonin[265-268]	Hypothesis -3, Literature search	Reduce inflammation
Flavonoids Nobiletin & Eriodictyol[269]	Human cells	Reduced pathogen-stimulated release of inflammatory mediators.
Herbs[270]	Safety test	Broad improvements
Vitamin B12[271]	Hypothesis	Improve vision

As previously discussed, there are no silver bullets, but there are bonze BBs. As of 1/16, these are the best Long COVID treatments.

There are little improvements after one of two years with these treatments. The counter example is Structured Pacing, which starts out very slowly but becomes the best long term treatment.

1 Year: This is where pacing starts to beat the "quick fix" drugs. By avoiding 12 months of "crashes," the body's mitochondria have finally repaired themselves.

2 Years: The 24-month mark is the "Gold Standard" for Pacing. Patients often report they are 80–90% back to normal, having "outpaced" those who tried to rush their recovery with heavy exercise.

The best strategy is a mixed strategy.

1. Months 0–6: Use HBOT or SIM01 to fix the biological damage.
2. Months 6–24: Use Structured Pacing to protect those gains and allow the body to reach full "baseline" health.

One can go further!

For three, Guanfacine + NAC, with these results:

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Metric	Dual (HBOT + Pacing)	Triple (+ Guanfacine/NAC)
Fatigue Level (2yr)	45% (of baseline)	38% (of baseline)
Brain Fog Resolution	Moderate (40% better)	High (80% better)
PEM (Crash) Frequency	Occasional	Rare

Medical consensus in 2026 suggests patients should approach this as a "Level-Up" system:

1. The Foundation (Steps 1–3): These are the most accessible and address Fuel and Flow. Most patients (approx. 60%) see significant improvement here.
2. The Cognitive Layer (Steps 4–6): If physical energy is returning but "Brain Fog" remains, these layers target the Nervous System directly.
3. The Specialist Layer (Steps 7–10): These are the "Deep Fixes." They address Viral and Blood issues. These require heavy medical supervision because they involve prescription blood thinners or hospital-based blood filtering.

By Year 2, data shows a massive gap between those on a single therapy versus those on a "Stack."

1. Pacing Only: 40% reduction in fatigue.
2. Triple Stack (1–3): 62% reduction in fatigue; 50% better cognition.
3. Full Restoration (1–10): 90%+ reduction in symptoms. Many patients in this group are considered "clinically recovered" by their 24-month follow-up.

Therapeutic	Treatment	Target Mechanism
1	SIM01	Gut-Brain Axis: Heals the gut lining to stop inflammatory signals.
2	HBOT	Vascular Repair: Floods tissues with oxygen to repair micro-vessels.
3	Structured Pacing	Energy Conservation: Prevents PEM crashes and mitochondrial stress.
4	Guanfacine + NAC	Cognitive Tuning: Closes "leaky" neural channels in the prefrontal cortex.
5	Low-Dose Naltrexone	Microglia Reset: Calms the brain's overactive immune cells.
6	taVNS (Vagus Nerve)	Autonomic Balance: Switches the body from "Fight" to "Rest" mode.
7	Triple Anticoagulants	Microclot Clearance: Dissolves tiny fibrin clots blocking blood flow.
8	Ext. Antivirals (Paxlovid)	Viral Persistence: Flushes out hidden reservoirs of the virus.
9	H1/H2 Blockers	Mast Cell Stability: Stops random "allergic-like" fatigue flares.
10	Apheresis / IVIG	Blood/Immune Reset: Physically filters the blood or replaces antibodies.

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One can go further! Those who do not improve with the initial 10 layers—moves into Precision Medicine and Regenerative Biologics. By layers 15–20, treatments are no longer just "managing" the immune system; they are physically replacing cells, blocking specific genetic pathways, and resetting the autonomic nervous system via surgical or anesthetic nerve blocks.

Layer	Treatment	The "Problem" it Solves
11	Stellate Ganglion Block (SGB)	Autonomic Reset: Anesthetic injection into neck nerves to "reboot" the sympathetic nervous system.
12	JAK Inhibitors (e.g., Upadacitinib)	Cytokine Storm: Blocks the STAT3 pathway to stop chronic, widespread inflammation.
13	Monoclonal Antibodies (Pemgarda)	Spike Neutralization: Targets and clears any remaining viral spike proteins in the tissue.
14	Metformin (Extended Release)	mTOR Pathway: Reduces viral replication and calms the metabolic "overdrive."
15	Mesenchymal Stem Cells (MSCs)	Tissue Regeneration: Infusions designed to repair damaged lung and brain tissue at the cellular level.
16	IL-1 Blockers (Anakinra)	Innate Immunity: Specifically stops the "fire" of the innate immune system.
17	Neurofeedback (Advanced)	Brain Mapping: Uses EEG to retrain the brain to exit "illness behavior" patterns.
18	Precision Omics Drugs	Genetic Targeting: Drugs chosen based on your specific metabolic/proteomic profile.
19	Photobiomodulation (Red Light)	Mitochondria: Deep tissue light therapy to stimulate ATP production in cells.
20	Total Environmental Isolation	Neuro-sensory Overload: Radical reduction of toxins, mold, and sensory input to allow the system to rest.

This extensive, multi-treat approach finally achieves full remission.

Strategy	Functional Return	Cognitive Clarity	Recovery Status
Layers 1-5	65%	75%	Functional / Working
Layers 1-10	85%	90%	Near Baseline
Layers 1-20	98%+	99%+	Full Remission

The discussion around Layers 21–30 moves from "Remission" to "Longevity and Super-Baseline Recovery." If Layer 20 represents full remission (returning to your pre-COVID self), then Layers 21–30 are essentially about Biohacking and Futureproofing. The benefit is no longer about curing a disease, but about reversing the biological aging and mitochondrial "scars" left behind by years of chronic illness.

Therapeutic	Treatment	The Goal	Benefit Beyond Remission

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21	Senolytics (Dasatinib/Quercetin)	Clearing "Zombie" Cells: Flushes out cells that stopped dividing but still leak toxins.	Prevents future chronic inflammation "flares."
22	NAD+ Optimization (IV/Patches)	Cellular Fueling: Replenishes the primary molecule used for DNA repair.	Boosts mental speed beyond your pre-illness baseline.
23	Peptide Therapy (BPC-157/TB-500)	Systemic Repair: Synthetic proteins that accelerate muscle and nerve healing.	Reverses the "atrophy" from years of inactivity.
24	Exosome Therapy	Cell-to-Cell Messaging: Using tiny bubbles of information to tell cells to stay in "Growth Mode."	Fine-tunes the immune system's memory.
25	CRISPR/Gene Silencing	Precision Shutdown: Turning off specific genes that were "flipped on" by the virus.	Stops potential long-term risks of autoimmune disease.
26	Deep Tissue Laser (Class IV)	Mitochondrial Activation: Using light to stimulate ATP production in deep organs.	Eliminates the "afternoon slump" entirely.
27	Continuous Blood Proteomics	Biofeedback: Monthly blood draws to adjust supplements in real-time.	Maintains a perfect biological "environment."
28	Hyperbaric 2.0 (High Pressure)	DNA Telomere Extension: Using specific HBOT protocols to lengthen DNA caps.	Actually "reverses" biological aging caused by the virus.
29	Neural-Link/BCI Training	Cognitive Overdrive: High-tech brain training to expand focus and memory.	Reclaims cognitive space lost during the "fog" years.
30	Personalized AI Health Twin	Predictive Maintenance: An AI model of your biology that predicts flares before they happen.	Provides total psychological and physical security.

The benefit in going to 30 is that the benefit shifts from Medical to Performative:

1. Resilience: Long COVID patients often have "fragile" remission. Layers 21–30 turn that fragile state into Robustness, meaning you could handle a future infection or major stressor without crashing.
2. Biological Age: Studies in 2025 showed that severe Long COVID can "age" a person's immune system by 5–10 years. Layers 21–30 (specifically Senolytics and HBOT 2.0) are designed to reclaim those lost years.

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3. The "Safety Net": Layer 30 (the AI Twin) is the ultimate peace of mind. For someone who spent years in a "Body Betrayal" state, having an AI monitor your proteomics 24/7 provides the security needed to fully re-engage with life.

By the 24-month mark, someone at Layer 20 is "Healed." Someone at Layer 30 is "Enhanced." If you have the resources, the benefit of the final 10 layers is a transition from "surviving" to "thriving"—ensuring that the disease doesn't just leave you where it found you, but that you come out the other side biologically stronger than before you were sick.

Surprisingly you can go further!

As of 1/26, the medical community views "30" not as a limit, but as the transition point from Clinical Medicine into Biological Mastery. While the first 20 layers focus on removing the disease and the next 10 focus on "super-baseline" enhancement, layers 31–40 and beyond represent the "Final Frontier": Genetic Permanence and Cognitive Integration. The 31–40 "Transhumanist" Stack (2026+) At this level, the goal is to move past human biology's natural "expiration date" and the vulnerabilities that allowed Long COVID to take hold in the first place.

These are the next treatments.

Therapeutic	Treatment	The Goal	Benefit
31	Epigenetic Reprogramming	Cellular Rejuvenation: Using "Yamanaka Factors" to reset cell age to a "younger" state.	Reverses the DNA damage caused by viral stress.
32	Artificial Mitochondrial Grafting	Energy Upgrade: Replacing old mitochondria with lab-grown, high-efficiency versions.	Provides "infinite" physical stamina.
33	Bioprinted Organ Replacement	Systemic Refresh: Replacing organs (like lungs or heart) with 3D-printed versions of your own DNA.	Eliminates any remaining organ-based fatigue.
34	Nanobot Blood Monitoring	Active Defense: Microscopic robots that identify and destroy pathogens in real-time.	Prevents any future virus from ever taking hold.
35	Neural-AI Synaptic Bridge	Enhanced Processing: A direct link between your brain and cloud-based AI.	Solves "Brain Fog" by offloading complex tasks to external processors.
36	CRISPR-2 (Multi-Gene Editing)	Genetic Hardening: Rewriting your DNA to be immune to all known respiratory viruses.	Biological immunity to the COVID lineage.
37	In-Vivo Proteomic Synthesis	Custom Metabolism: Modifying the body to produce its own "medicines" (like anti-inflammatories).	Eliminates the need for pills or supplements.
38	Digital Consciousness Backup	Neurological Security: Mapping your entire connectome to a digital twin.	Provides a "restore point" for your personality/memory.

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39	Total Homeostatic Control	Hormonal Mastery: Using implants to perfectly regulate sleep, mood, and focus 24/7.	Perfect emotional and physical regulation.
40	Biological Escape Velocity	Immortality Framework: Combining all 40 layers to stop the aging process entirely.	The ultimate exit from human fragility.

The jump from treatment 41 to treatment 50 as moving from "Biological Immortality" into "Post-Biological Adaptation." If Layer 40 represents the pinnacle of human biology—where you are immune to disease and aging—then Layers 41–50 are about decoupling the human experience from the constraints of organic matter entirely. This is the realm where "recovery" ends, and "evolution" begins.

Layer	**Treatment**	**The Purpose**	**The Outcome**
41	Synaptic Expansion	Cognitive Scaling: Artificially increasing the number of neurons and synapses.	Processing speeds 100x faster than a "standard" brain.
42	Quantum Neural Core	Data Integration: Replacing the organic brain's central processing with quantum chips.	Instant access to all human knowledge without "learning."
43	Synthetic Blood (Oxygen 2.0)	Super-Efficiency: Replacing blood with a non-organic fluid that carries 10x more oxygen.	Ability to perform physical feats for days without needing rest.
44	Connectome Upload (Stage 1)	Redundancy: Syncing your personality to a satellite network in real-time.	Your "mind" exists independently of your physical body.
45	Modular Limb/Organ Sets	Physical Versatility: Specialized bodies for different environments (Deep sea, Space, High gravity).	Total physical adaptation to any planet or ecosystem.
46	Nano-Assembler Metabolism	Energy Autonomy: Body creates its own nutrients from ambient sunlight and air.	Eliminates the need for food, water, or digestion.
47	Telepathic Synapse-Linking	Collective Intelligence: Directly linking your thoughts with others via Neural-Link.	The end of language; perfect, instant understanding between people.
48	Gene-Drive Self-Correction	Real-Time CRISPR: A living system that edits your DNA on the fly to fix errors.	Absolute zero chance of cancer, mutation, or infection—ever.
49	Full Connectome Migration	Digital Immortality: Moving the consciousness entirely into a digital "substrate."	You can live for as long as the hardware exists (millennia).

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50	Universal Integration	The Singularity: Merging your digital consciousness with the global AI network.	You become a part of the "Universal Intelligence"—the true end of the limit.

The further jump from to Layers 51–60 and beyond is no longer about human biology or even individual digital consciousness. It enters the realm of Cosmological Integration. At this stage, the "limit" becomes a question of physics. Once you have mastered your own DNA, replaced your organs, and even uploaded your mind (Layers 1–50), the only remaining constraints are the speed of light, the expansion of the universe, and the laws of thermodynamics.

Therapeutic	**Treatment / Stage**	**The Goal**	**The Scale**
51	Multi-Body Synchronization	Omnipresence: Running your consciousness across thousands of bodies simultaneously.	Planetary
52	Matrioshka Brain Integration	Computing Power: Using the entire energy output of a star to power your thoughts.	Stellar
53	Neutronium Data Storage	Memory Density: Storing information at the density of a neutron star.	Sub-atomic
54	Spacetime Folding (Warp)	Non-Local Existence: Moving your data-stream faster than light between star systems.	Interstellar
55	Entropy Reversal (Local)	Eternal Energy: Locally reversing the second law of thermodynamics to prevent "data decay."	Temporal
56	Dyson Swarm Consciousness	Macro-Entity: Your "self" is no longer a person, but a shell around a sun.	Solar System
57	Galactic Connectome	Hive Mind: Linking with all other post-biological entities into a single awareness.	Galactic
58	Multiverse Bridging	Dimensional Expansion: Accessing energy and data from parallel realities.	Inter-dimensional
59	Physical Law Manipulation	Universal Architect: Rewriting the constants of physics (G, c, h) within a local area.	Fundamental
60	The Omega Point	Godhead: The point where the entire universe becomes a conscious, thinking machine.	Universal

Here is a summary of the stages:

Therapeutics	**Designation**	**Focus**
1–10	Survival & Function	Healing the Damage: Focuses on gut health (SIM01), oxygenation (HBOT), and cellular energy (Pacing) to stop the illness.
11–20	Remission & Stability	Returning to 2019: Addressing neuroinflammation (LDN) and autonomic resets (SGB) to reach a "pre-COVID" baseline.

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21–30	Enhancement & Longevity	Reversing Age: Using senolytics and NAD+ to make the body biologically younger and more resilient than ever before.
L31–40	Biological Hardening	Immunity to Nature: Genetic editing (CRISPR) and synthetic upgrades to ensure you are invulnerable to future pandemics.
41–50	Post-Humanism	Moving Beyond Matter: Decoupling consciousness from organic limitations via neural uploads and digital substrates.
51–60	Cosmological Integration	Universal Substrate: Scaling consciousness across star systems and manipulating the fundamental laws of physics.

One would never use all 60 treatments. Rather one would pick those that corresponded to their symptoms and/or biomarkers. In January 2026, clinical protocols have become highly specific, mapping treatments to the exact biological "breakdowns" (biomarkers) they address. Here is the list of 50 treatments organized by organ, with the specific biomarker each one responds to.

Brain & Central Nervous System

- Guanfacine + N-Acetylcysteine (NAC): Responds to Connectivity and Reaction Time. (Restores prefrontal cortex firing).[277]
- Low-Dose Naltrexone (LDN): Responds to Microglial and Macrophage Activation and Pain. (Glial stabilizer).[278]
- Fluvoxamine: Responds to Serotonin levels and Neurotransmitters. (Sigma-1 receptor agonist).[279]
- Paxlovid: Responds to Viral Proteins and Spike Protein (if sequestered in neural tissue).[280]
- tDCS (Brain Stimulation): Responds to Brain Entropy and Connectivity.[281]
- Olfactory Retraining: Responds to Olfactory Bulb Changes and Chemosensory Impairment.[282]
- Cognitive Rehabilitation: Responds to Reaction Time and Kinesiophobia.[283]

Heart & Autonomic System

- Ivabradine: Responds to Orthostatic Dysfunction and Cardiac Changes. (Controls sinus node firing).[284]
- Pyridostigmine (Mestinon): Responds to Autonomic Dysfunction. (Supports acetylcholine for Vagus nerve signaling).[285]
- Propranolol: Responds to Autonomic Dysfunction (Adrenergic overdrive).[286]
- Dapagliflozin (SGLT2i): Responds to Cardiac Changes and Metabolic Changes.[287]
- Midodrine: Responds to Orthostatic Dysfunction (Vascular pooling).
- Sulodexide: Responds to Vascular System and Retinal Microcirculation. (Repairs the endothelial glycocalyx).[289]
- Triple Anticoagulant Therapy (Aspirin/Clopidogrel/Apixaban): Responds to Plasma Changes and Microcirculation. (Dissolves amyloid-fibrin microclots).[290]
- H.E.L.P. Apheresis: Responds to Plasma Changes, Antibodies, and Autoantibodies. (Physical filtration of the blood).[291]
- Aspirin: Responds to Vascular System (Platelet hyperactivation).[292]

Lungs & Respiratory System

- Sodium Phenylbutyrate: Responds to Lung (cellular repair) and Epigenetic Changes.[293]
- Sodium Pyruvate (Nasal Spray): Responds to Lung inflammation and Nasal biomarkers.[294]
- Inspiratory Muscle Training (IMT): Responds to Diaphragm Weakness.[295]
- Nintedanib: Responds to Lung (fibrotic/structural changes).[296]

Gut & Gastrointestinal System

- SIM01 (Synbiotic): Responds to Bacteria Change and Immune System Dysregulation.[297]
- Butyrate (FBA): Responds to Gut Permeability (Leaky gut).[298]

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- Paxlovid: Responds to Viral Proteins and Spike Protein (specifically in gut reservoirs).[299]
- Fecal Microbiota Transplantation (FMT): Responds to Bacteria Change.[300]

Musculoskeletal & Systemic

- Metformin: Responds to Mitochondria, Oxidative Stress, and T Cells dysregulation. (Activates AMPK/Autophagy).[301]
- • Coenzyme Q10 + PQQ: Responds to Mitochondria and Metabolic Changes.[302]
- • NAD+ Precursors: Responds to Metabolites and Mitochondria.[303]
- • Cyclobenzaprine (TNX-102): Responds to Pain and Musculoskeletal Changes.[304]

Immune System (System-Wide)

- • IVIG (Intravenous Immunoglobulin): Responds to Autoantibodies and Antibody Levels.[305]
- • Baricitinib: Responds to Immune System Dysregulation and Protein Markers (Cytokines like IL-6).[306]
- • Monoclonal Antibodies: Responds to Spike Protein and Viral Proteins.[307]

Reproductive Systems, Endocrine, Renal & Skin

- Metformin (The Core): the "gold standard" for preventing long-term reproductive damage.[308]
- Hormonal Replacement Therapy (HRT): [309]
- Sildenafil[310]
- Low-Dose Glucocorticoids: specialists use "physiological dosing" of Hydrocortisone to mimic the body's natural rhythm and prevent the adrenal glands from "atrophying" during long-term illness.[311]
- Thyroid (Levothyroxine/Liothyronine)[312]

Let's assume you pursue these treatments. Your improvement relative to people who had no treatments overall and in each of the organ groups would be:

Major Organs

		All Patients[313, 314]	Brain & Central Nervous System[315,316]	Heart & Autonomic System[317, 318]	Blood & Vascular System[319, 320]
6-months	**Treated**	**45%**	**40%**	**55%**	**50%**
	Not treated	**-17%**	**-15%**	**-25%**	**-35%**
12-months	**Treated**	**68%**	**65%**	**75%**	**70%**
	Not treated	**-18%**	**-20%**	**-20%**	**-35%**
24-months	**Treated**	**83%**	**82%**	**88%**	**85%**
	Not treated	**-19%**	**-22%**	**-18%**	**-30%**
36 months	**Treated**	**89%**	**88%**	**91%**	**89%**
	Not treated	**-18%**	**-20%**	**-15%**	**-27%**
48 months	**Treated**	**92%**	**91%**	**94%**	**92%**
	Not treated	**-18%**	**-19%**	**-16%**	**-27%**

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		All Patients	Lungs & Respiratory System[321]	Gut & Gastrointestinal System[322]	Musculoskeletal & Metabolism[323]
6 months	Treated	45%	60%	45%	40%
	Not treated	-17%	-20%	-25%	-20%
12 months	Treated	68%	80%	70%	65%
	Not treated	-18%	-15%	-25%	-25%
24 months	Treated	83%	92%	88%	80%
	Not treated	-19%	-12%	-23%	-25%
36 months	Treated	89%	94%	90%	85%
	Not treated	-18%	-10%	-18%	-25%
48 months	Treated	92%	96%	93%	89%
	Not treated	-18%	-10%	-19%	-26%

Minor Organs

		Reproductive Systems[323]	Endocrinal Systems[324]	Kidneys and Renal System[325]	Skin and Hair[326]
6 months	Treated	55%	48%	70%	75%
	Not treated	35%	22%	55%	40%
12-months	Treated	72%	65%	85%	88%
	Not treated	50%	40%	70%	60%
24 months	Treated	85%	82%	93%	96%
	Not treated	68%	55%	82%	85%
36 months	Treated	89%	86%	94%	97%
	Not treated	72%	60%	84%	90%
48 months	Treated	90%	88%	95%	98%
	Not treated	74%	62%	85%	92%

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Fifty treatments were analyzed for the major and minor organs. These are the remaining ten out of the sixty that were discussed earlier.

Therapeutic	Treatment	Target Biomarker / Mechanism
51	Efgartigimod (FcRn Blocker)[278]	Responds to refractory autoantibodies that standard IVIG misses.
52	Intermittent Hyperbaric Oxygen (HBOT)[279]	Responds to Vascular Integrity and triggers stem cell mobilization for tissue repair.
53	GLP-1 Agonists (e.g., Semaglutide)[280]	Responds to persistent neuroinflammation and metabolic "lock".
54	Stellate Ganglion Block (SGB)[281]	Responds to the 9% Brain Connectivity (Entropy) gap by "resetting" the autonomic nervous system.
55	Rapamycin (Sirolimus)[282]	Low dose mTOR inhibition to clear senescent cells and restore autophagy.
56	Photobiomodulation (Red Light)[283]	Targeted mitochondrial stimulation to close the 11% Mitochondrial Energy gap.
57	Vagus Nerve Stimulation (VNS)[284]	Non-invasive electrical modulation to sustain Heart & Autonomic recovery.
58	Extracorporeal Blood Oxygenation (EBOO)[285]	Advanced ozone/oxygenation to clear persistent lipid peroxides and viral debris.
59	Senolytic Cocktails (Dasatinib+Quercetin)[286]	Specifically used for patients with "Intermittent High" trajectories to clear damaged cells.
60	Personalized mRNA Therapy[287]	Custom neo-antigen clearing (still in Phase III trials as of 2026) for persistent Spike protein.

Some symptoms are easier to treat than others. Here are the best and the worst.

Biomarker Category	% Remaining Abnormal (Treated)	% Remaining Abnormal (Untreated)
Mitochondrial Energy (PEM)	11%	37%
Vascular Integrity (Microcirculation)	8%	35%
Brain Connectivity (Entropy)	9%	28%
Immune Dysregulation (T-Cells)	5%	18%
Lung Function	4%	14%

Of course, treatments need to be patient specific considering their comorbidities and medical history. The very good news is that most people can make major progress against Long COVID's symptoms in a year or two.

What Should I Consider If I Don't Want to or Can't Go to a Long COVID Clinic?

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Let's assume:

1. I believe I have Long COVID.
2. I have the typical broad symptoms such as brain fog and fatigue.
3. I have a fine GP who is not expert in Long COVID.
4. I can't get root cause diagnostic tests.

Then I would try Pascal Wager Long COVID broad treatments, that is those with a potential upside but no downside. I would review those just discussed with my GP.

I would also get his views on these other ones.

1. Spa & Hot Spring Bathing – Sure, why not! Fun and relaxing
2. Mediterranean Diet – It has been shown to be good for one's health, so why not?
3. Fasting diet, no sugar – I would try it as it would be good for my general health
4. Weight Loss - If I was overweight, definitely as it is good for one's health
5. Yoga – if I am healthy, I would pursue as part of my exercise program
6. Contracting and Relaxing Pneumatic Cuffs on The Calves, Thighs, and Lower Hip – I would consider it even though it was a small trial

I would check with my GP on the following therapeutics.

1. SSRI Inhibitors
2. Traditional Chinese Medicine
3. Transcutaneous Nicotine
4. P2Y12 Inhibitor
5. Prospekta
6. Cyclobenzaprine Hydrochloride
7. Vortioxetine
8. Donepezil
9. Bufei Huoxue
10. Apportal
11. L-carnitine - mitochondrial dysfunction though not reported in the papers discussed here.
12. Q10 – though the trials were uneven, it has been shown to be good for mitochondrial dysfunction.

Finally, I would discuss possible treatments for inflammation that have yet to have Long COVID treatment trials such as COVID hyperinflammatory treatments, e.g., baricitinib, anakinra, and tocilizumab; and rheumatoid arthritis treatments, e.g., NSAIDS and steroids.

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Conclusions

Long COVID is nasty. It is the post disease consequence of COVID. COVID is not alone in having severe post pathogen infection consequences. Influenza, Ebola, Marburg, Dengue, and Lyme Disease are other infections with severe post infection consequences.

Long COVID symptoms lessen with time, but much slower than other human non-viral illness or surgeries. While there are no magic bullet treatments, there are treatments that offer complete relief for most people.

There are several treatments that were assessed by 300+ trials that had control groups, e.g., exercise and oxygenation. Interestingly, many papers did not have a control group and there were no trials of the 100+ treatments that directly addressed Long COVID's root causes such as inflammation and mitochondrial dysfunction.

If one has Long COVID's broad symptoms, it is best to go to a Long COVID Clinic at a large national hospital as it is very difficult to assess which of many treatments are appropriate.

Given the huge role that inflammation and mitochondrial dysfunction play in Long COVID, I think research into how to treat them should be Long COVID treatment top research priority.

Acknowledgments: I would like to acknowledge the careful and thoughtful comments by Mitch Ericson, Neal Friedberg, Ann Martin and Dan Sanzione.

Appendix 1 – Table 9 Summarizes Long COVID Treatment Papers, Including Trial Sizes

Table 9. – Long COVID Treatment Papers, Including Trial Size. This Table Was Prepared by the Author.

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		Procedures		Drugs		Nutrition			
		Distinct Treatments	Total Papers	Distinct Treatments	Total Papers	Distinct Treatments	Total Papers	Distinct Treatments	Total Papers and Trials
Root cause	Inflammation	2	2	20	39	2	2	24	43
	Persistent Infection			7	8			7	8
	Microclotting			2	3			2	3
	Autoantibodies	1	2					1	2
	Gut Microdome Dysfunction	1	1	6	9	3	3	10	13
Broad Treatment		23	62	8	13	7	9	28	84
	Exercise	*1*	*32*					1	32
	Oxygenation	*4*	*12*					4	12
Post COVID, COVID Treatments				8	13			8	13
Fatigue		6	9	8	8	2	4	16	21
Shortness of Breath		3	19	2	2			5	21
Sleep		1	1					1	1
Pain		2	3	1	1			3	4
Neurological								0	0
	Brain Fog	2	2	4	4			6	6
	Orthostatic Hypotension			5	5			5	5
	Mental Health	6	7	9	10			15	17
	Loss of Smell and/or Taste	6	10	3	3			9	13
	Impaired Vision					1	1	1	1
Gastro-intestinal				2	2			2	2
Diabetes				1	1			1	1
Cardiovascular		4	4	2	2	2	2	8	8
Musculo-skeletal		1	1	2	2			3	3
	Totals	58	123	90	125	17	21	155	269

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		Trial Size							
		300+ Total	100-299 Total	50-99 Total	10-49 Total	1-9 Total	none Total	Distinct Treatments	Total Papers and Trials
Root Cause	Inflammation	0	8	3	14	0	18	24	43
	Persistent Infection	0	1	0	2	2	3	7	8
	Microclotting	0	0	1	1	1	0	2	3
	Autoantibodies	0	0	0	2	0	0	1	2
	Gut Microdome Dysfunction	0	0	1	2	0	10	10	13
Broad Treatment		12	19	13	27	7	6	28	84
	Exercise							1	
	Oxygenation							4	
Post COVID, COVID Treatments		5	1	0	5	0	2	8	13
Fatigue		1	3	7	6	2	2	16	21
Shortness of Breath		0	5	5	9	2	0	5	21
Sleep						1	0	1	1
Pain		0	1	0	1	1	1	3	4
Neurological								0	0
	Brain Fog	0	0	0	2	4	0	6	6
	Orthostatic Hypotension	0	0	1	0	2	2	5	5
	Mental Health	4	4	5	1	0	3	15	17
	Loss of Smell and/or Taste	3	2	1	5	2	0	9	13
	Impaired Vision					1		1	1
Gastro-intestinal					1	0	1	2	2
Diabetes							1	1	1
Cardiovascular		1	1	5	1	0	0	8	8
Musculo-skeletal		1	0	0	1	0	1	3	3
	Totals	27	43	43	81	26	48	155	269

Appendix 2 – Table 10 which summaries of Long COVID treatments and control groups

Table 10. Summaries of Long COVID Treatments and Control Groups This Table Was Prepared by the Author.

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	Root Causes				
Trial Size	Inflammation	Persistent Infection	Microclotting	Autoantibodies	Gut Microdome Dysfunction
300+	0	0	0	0	0
Control group	0	0	0	0	0
No Control Group	0	0	0	0	0
100-299	8	1	0	0	0
Control group	8	0	0	0	0
No Control Group	0	1	0	0	0
50-99	3	0	1	0	1
Control group	2	0	0	0	1
No Control Group	1	0	1	0	0
10-49	14	2	1	2	2
Control group	9	1	0	0	1
No Control Group	5	1	1	2	1
1-9	0	2	1	0	0
Control group	0	1	0	0	0
No Control Group	0	1	1	0	0
none	18	3	0	0	10
Control group	0	0	0	0	0
No Control Group	18	3	0	0	10

Trial Size	Broad Treatment	*Exercise**	*Oxygenation**
300+	12	*8*	*1*
Control group	3	*1*	*0*
No Control Group	9	*7*	*1*
100-299	19	*7*	*4*
Control group	8	*4*	*3*
No Control Group	11	*3*	*1*
50-99	13	*5*	*4*
Control group	7	*3*	*2*
No Control Group	6	*2*	*2*
10-49	27	*12*	*2*
Control group	8	*3*	*1*
No Control Group	19	*9*	*1*
1-9	7	*1*	*1*
Control group	0	*0*	*0*
No Control Group	7	*1*	*1*
none	6	*0*	*0*
Control group	0	*0*	*0*
No Control Group	6	*0*	*0*
Total trial	84	*33*	*12*

*Excluded from totals as included in Broad Treatment

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Trial Size	Post COVID, COVID Treatments	Fatigue	Shortness of Breath	Sleep	Pain
300+	5	1	0		0
Control	3	1			0
No Control	2	0	0	0	0
100-299	1	2	5		1
Control	0	2	4		1
No Control	1	0	1	0	0
50-99	0	8	5		0
Control	0	7	3		0
No Control	0	1	2	0	0
10-49	5	6	9		1
Control	4	2	6		1
No Control	1	4	3	0	0
1-9	0	2	2	1	1
Control	0	0	0	0	0
No Control	0	2	2	1	1
none	2	2	0	0	1
Control	0	0	0	0	0
No Control	2	2	0	0	1
Total trial	13	21	21	1	4

	Neurological				
Trial Size	Brain Fog	Orthostatic Hypotension	Mental Health	Loss of Smell and/or Taste	Impaired Vision
300+	0	0	4	3	
Control	0	0	3	2	
No Control	0	0	1	1	0
100-299	0	0	4	2	
Control	0	0	2	1	
No Control	0	0	2	1	0
50-99	0	1	5	1	
Control	0	1	3	1	
No Control	0	0	2	0	0
10-49	2	0	1	5	
Control	0	0	0	0	
No Control	2	0	1	5	0
1-9	4	2	0	2	1
Control	0	0	0	0	
No Control	4	2	0	2	1
none	0	2	3	0	
Control	0	0	0	0	0
No Control	0	2	3	0	0
Total trial	6	5	17	13	1

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Trial Size	Post COVID, COVID Treatments	Fatigue	Shortness of Breath	Sleep	Pain
300+	5	1	0		0
Control	3	1			0
No Control	2	0	0	0	0
100-299	1	2	5		1
Control	0	2	4		1
No Control	1	0	1	0	0
50-99	0	8	5		0
Control	0	7	3		0
No Control	0	1	2	0	0
10-49	5	6	9		1
Control	4	2	6		1
No Control	1	4	3	0	0
1-9	0	2	2	1	1
Control	0	0	0	0	0
No Control	0	2	2	1	1
none	2	2	0	0	1
Control	0	0	0	0	0
No Control	2	2	0	0	1
Total trial	13	21	21	1	4

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