

COVID-19 “Long Hauler” Options

“I’ve been sick for four months, weak and brain foggy. To most doctors, that just sounds ridiculous. But to me, it’s more like hell.” Post COVID-19 “long hauler” patient.

This Special Report is Dedicated to Sarah, my first “Long Hauler” requesting support



CAUTION: This is an important disclaimer. This special report is for your information only. This report cannot discover, diagnose, analyze, or prescribe any intervention. I am not an M.D. Having said that, some MDs are unfamiliar with a wider range of options (or unwilling to do things they cannot prescribe). This is a new field. Ask when you do not understand. Many (not all) products suggested are available on Amazon. Additional resources and journal article citations are at the end of this report. Do not make any decision based solely on this information. Always consult your primary physician before deciding. Proceed carefully and make your own decision. Assess all risks and the potential rewards. By reading this, you accept responsibility for your choices.

This Background is Relevant

Many just want to know, “What do I do?” I understand that. Yet, just a bit of reader-friendly background will guide you in not just what to do, but the sources, risks, dosages and ranking or priority for where to start.

1. The evidence (so far) suggests that the 30+ extended, long-term COVID-19 symptoms are associated with a wide range of neurological disorders. For many, even a light walk, preparing a meal or answering a questionnaire can leave many bedridden for hours or days.

2. There are increasing reports of central and peripheral nervous system involvement. It displays as a distinct clinical syndrome characterized by lasting fatigue that worsens even after exercise or mental exertion as a post-exertional malaise.

3. At this time, the plausible mechanisms for the various neurological syndromes include, either individually or in combination:

- a) *direct viral neuronal attack (cells attacked in your brain)*
- b) *a secondary hyperinflammation syndrome (multiple organs attacked)*
- c) *complex inflammatory and/or immune-mediated disorders*

4) Most “long haulers” are women and the average age is 44. The longer this remains in your body, the more your risk goes up. Your risk depends on the *quantity of viral upload* at time of exposure, *the strength* of your immune system, *your resources* (support, time, money, intention), *specific genes*, and the targeted actions *you take in the next 90 days*.

5) This means, drop everything else and “all hands on deck.” Without your health, life is clearly “less than.” You are in this 100%. Be willing to accept small “wins,” week after week after week. Nobody out there has the perfect solution (yet). It is too new to know it all. Your body is fighting itself. Give it every possible chance to heal itself ASAP. Get going. Now.

The Most Critical Problem to Solve

The most critical problem is biological; all human cells need oxygen. The primary need for this disease in your body is for more O_2 . That’s why, in a hospital, you get oxygen support. The white blood cells are your body’s natural army of defenders. They include Cytokines (interleukins and interferon), Phagocytes (neutrophils and macrophages) and Lymphocytes (B cells, T cells and Natural Killer cells). However, low oxygen levels weaken the body’s ability to fight off pathogens. It can also trigger an *over-reaction in your immune system*. That’s bad. Now you’re fighting yourself.

Graphic below: Chronic COVID syndrome and neuro-COVID in long-haulers are described below: L side has symptoms and R side has potential outcomes B (B 1 or B 2).

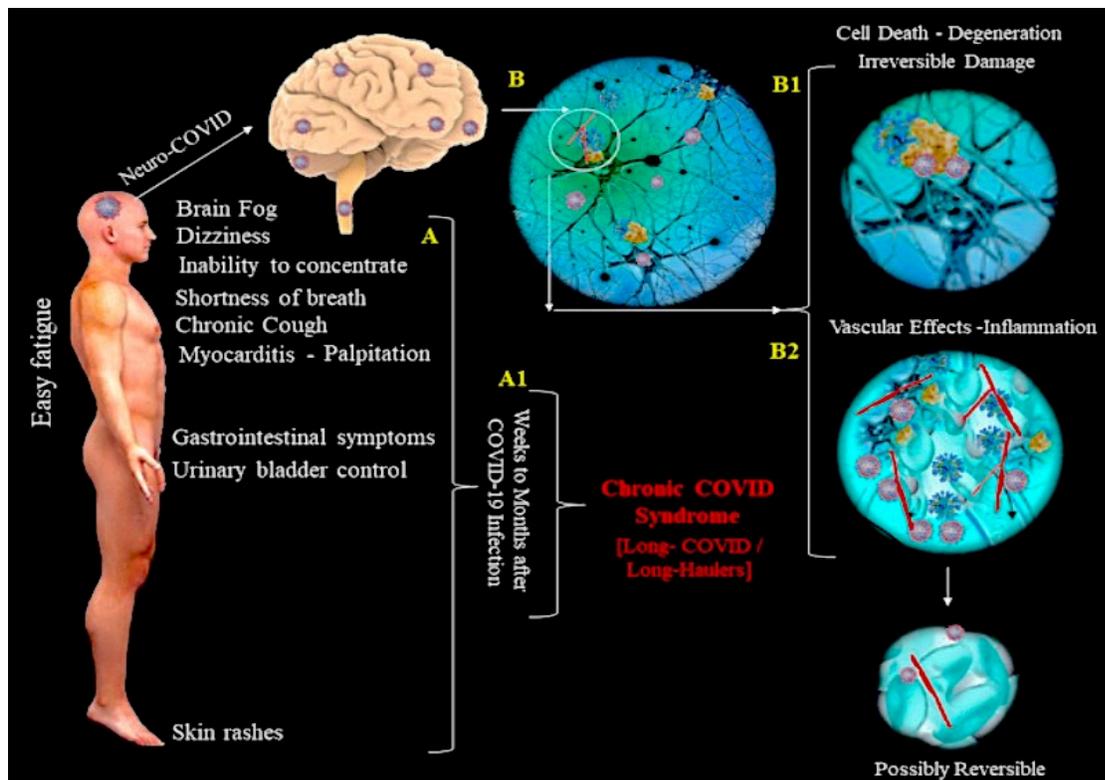


Illustration credit to: Baig A. M. (2020). Deleterious Outcomes in Long-Hauler COVID-19: The Effects of SARS-CoV-2 on the CNS in Chronic COVID Syndrome. *ACS chemical neuroscience*, 11(24), 4017–4020.

Patients who enter the **chronic-phase** of COVID-19 exhibit the symptoms as shown on the L side. Potential outcomes are on R side: B (B1 or B2).

“A” symptom: multi-organ and neural signs. The neurological syndrome is seen in the long-haulers (see human figure on L hand side).

“B” the broader outcomes: **B1** is neural cell death and yet this neuro-cellular degeneration may be irreversible. **B2** is an underlying degeneration and/or a low-grade inflammation. Yet, with appropriate interventions, it’s possible to regain health.

The effects of a severe systemic disorder with the neurological consequences of sepsis, hyperpyrexia, hypoxia, hypercoagulability and critical illness are possible. In short, your immune system is fighting itself.

Other Problems to Solve Include:

1. Your economic capacity to purchase healing options
2. Your time frame (are you early, middle or late in this process)

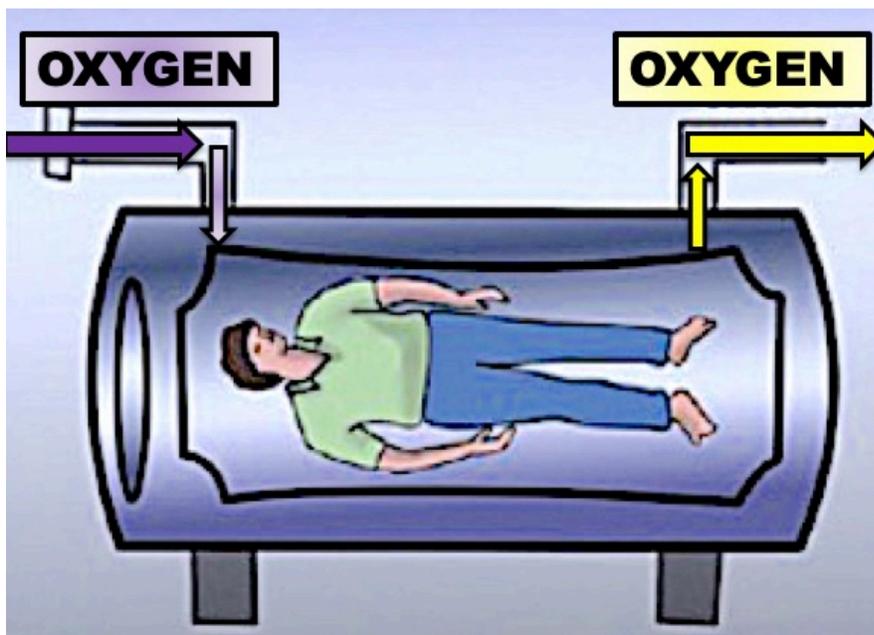
3. Your willingness to commit to engage in new habits, purchasing and implementing new interventions and behaviors. See habit changers at the end of this report. Read them carefully and apply with life or death focus.
4. Arranging social support from family and peers for your new actions
5. Making time to create lists for everything you do. Use daily morning, midday and evening to track the results. If you have already started that, keep doing it. Managing fatigue and energy is now your full-time job.

Behaviors to Engage in Immediately

Here's a short list of some lifestyle behaviors that can improve immune system functioning. Ensure you are focused on managing the inflammation and increasing oxygen to your cells. Your secondary chores? Read this, make a list, then prioritize. Managing your stress levels and increasing the body's production of new brain cells (neurogenesis). Yes, that's possible.

Locate a HBOT Provider

Hyperbaric oxygen therapy (HBOT) is a medical treatment that increases the amount of oxygen in a patient's blood. HBOT involves breathing pure oxygen in a pressurized environment. This is done by increasing the air in your resting chamber to 2-3 times sea-level air pressure and breathing 100% oxygen. It oxygenates nearly every cell in your body over time.



Visit and check out a nearby facility. Ask many questions about potential treatments and risks. You want a significant increase in oxygen in your body. That gets every bodily ally on your side. There are often centers within driving distance. Each session costs about \$150 and you may need

up to 20 sessions to get your brain back (that's cheap if it can help you get your life back). Insurance does not cover this. If it was me, this would still be on my top five list.

Senniappan, K., Jeyabalan, S., Rangappa, P., & Kanchi, M. (2020). Hyperbaric oxygen therapy: Can it be a novel supportive therapy in COVID-19? *Indian journal of anesthesia*, 64(10), 835–841.

Exercise that Fits Your Situation

Avoid any “formula.” You’ll have to find your own “sweet spot.” A longer duration (about 40 minutes) of vigorous or moderate exercise will elicit the greatest effects on muscles, oxygen levels and BDNF (brain-derived neurotrophic factors) levels. At your stage, it may be too exhausting.

I focus on short, 12-15 minute HIT (high intensity training) for quick oxygenation. Work out hard for a minute; catch your breath. Repeat for 12-15 minutes. I also use breathing practices, yoga, and breath work. If it was me, this would still be high on my list.

Hot baths: A hot soak in the tub might increase your cognitive functioning (and BDNF levels). No surprise here; heat shock therapy (such as sauna bathing) reduces the risk of developing a wide range of diseases, including dementia. A study of the effects of head-out-immersion in hot water found that BDNF levels were two-thirds higher after a 20-minute soak in water that was 42°C (108°F) than before soaking. BDNF remained high for 15 minutes post-soak. If it was me, this would be high on my list.

Daily naps. These restore the brain and recharge the body. My naps are 15-30 min. because I try to catch myself at the “low” time in my circadian rhythm. Break up the day into “must-do” productive time chunks of 30-60 minutes (or less), then pad your day with full rest time before and after.

Maquet P, Peigneux P, Laureys S, Smith C. (2002). Be caught napping: you're doing more than resting your eyes. *Nat Neurosci*. 5, 618-9.

Sauna time: Sauna bathing (heat-shock therapy) was studied for immune function in the Kuopio Ischaemic Heart Disease Risk Factor Study (KIHD), involving more than 2,000 middle aged adults. Based on their sauna-bathing habits, the study participants were divided into three groups: low, moderate and high users. The more frequently saunas were taken, the lower was the risk of dementia. If it was me, this would be high on my list.

Laukkanen T, Kunutsor S, Kauhanen J, Laukkanen JA. (2017). Sauna bathing is inversely associated with dementia and Alzheimer's disease. *Age Ageing*. 46,245-249.

Meditation: BDNF (Brain Derived Neurotrophic Factor) appears to play a role in the mind-body connection. A study of experienced meditators in a three-month-long yoga and meditation retreat found that the participants' plasma BDNF levels increased threefold relative to their pre-retreat levels. Their self-reported scores for depression and anxiety (which were pretty low even at the beginning of the retreat) decreased by about 60 percent. If it was me, this would be near the top of the list.

Gomutbutra et al., (2020). The Effect of Mindfulness-Based Intervention on Brain-Derived Neurotrophic Factor (BDNF): A Systematic Review and Meta-Analysis of Controlled Trials. *Front Psychol.* 11:2209.

Cognitive training

Exercising the body increases BDNF levels, but exercising the brain does, too. An intervention trial involving sedentary, elderly women with mild cognitive impairment found that 8 weeks of computer-based training raised the women's plasma BDNF levels by 26%. In light of BDNF's role in brain function, it's not surprising that the women also showed improvements in working memory and processing speed. These improvements lasted at least six months after the intervention. If it was me, this would be high on the list. Be frugal with your monitors; *cut your screen time by 50%*.

Karssemeijer EGA, Aaronson JA, Bossers WJ, Smits T, Olde Rikkert MGM, Kessels RPC. (2017). Positive effects of combined cognitive and physical exercise training on cognitive function in older adults with mild cognitive impairment or dementia: A meta-analysis. *Ageing Res Rev.* 40,75-83.

Attitude

Engage “*Amor Fati.*” That is Latin, for “Love the fate you’re given.” No griping, grumbling or complaining. Those negative behaviors just foster stress. Choose this path because *when you choose a path*, it reduces a cortisol response (vs. being told or asked to do it). Choice in this process is critical because it manages the stress response. You cannot afford to be stressing yourself out every day with whining. You are choosing life! If it was me, this would be *number one on my list*. With a strong attitude, everything has a better chance of working. Make a sign, **AMOR FATI.**

Kupcewicz E, Szypulska A, Doboszyńska A. (2019). Positive Orientation as a Predictor of Health Behavior during Chronic Diseases. *Int J Environ Res Public Health.* 16, 3408.

De-Stressing Tools (3 Levels)

Stress Prevention: foster mindfulness, journaling, meditation, nutrition and healthy friends. Also avoid toxic situations and toxic people.

Stress Resistance: HIT high intensity exercise, select nutrition, keep small tiny daily habits and having practiced mini-exposure to stress and recovery.

Stress Resilience: take or redirect to new actions, talk it over with a friend, reframe it, give or get a hug, or use the 1-week rule: “If this won’t matter a

week from now, I'll walk away". If it was me, this would be near the top.

Maier SF & Watkins LR (2010). Role of the medial prefrontal cortex in coping and resilience. *Brain Res.* 1355, 52-60

Eating: What Foods to Avoid

Your mission is to *erase* inflammatory foods from your diet and increase antioxidants. Inflammatory food lists are long. I would cut the grains, breads, chips, crackers, and most snack products by 90%. Reduce alcohol to maybe one drink a week (red wine). Stop all desserts except dark chocolate. Avoid most protein bars (there are exceptions such as UCAN). Most are loaded with sugar. Cut out all high sugar fruits such as bananas, mangos, strawberries, oranges and peaches and dried fruit snacks.

Sugars are inflammatory. Reduce your sugar, your high fructose corn syrup, artificial sweeteners and starches (they'll turn into sugars). Rice, beans, pasta, cookies, grains, donuts, chips and potatoes should make up 10% or LESS of your total diet. When there's no constant influx of starches, your body will begin to burn fat. Cut out the tortillas, waffles, pita bread, French toast, pancakes, breakfast toast and pre-meal restaurant breads.

Stop all flavored yogurts. Stop all soft drinks. If it comes in a box or a bag, eat less of it. If it comes in a can, eat less of it. Cut out deep fat fried foods (French fries, fish and chips, fried chicken, etc.). Give yourself the guilty pleasure of 3 "whatever" meals (one breakfast, one lunch and one dinner) *per week* and no more. High inflammatory foods are toxic for your body. If it was me, this would be very high on the list. You cannot afford to be sloppy in this critical time of your life. Your beliefs and values are not shown by your talk, *but by your actions*.

Giugliano D, Ceriello A, Esposito K. (2006) The effects of diet on inflammation: emphasis on the metabolic syndrome. *J Am Coll Cardiol.* 48, 677-85. Freeman CR, Zehra A, Ramirez V, Wiers CE, Volkow ND, Wang GJ. (2018). Impact of sugar on the body, brain, and behavior. *Front Biosci (Landmark Ed).* 23:2255-2266.

Caloric Restriction (CR)

Are you going to starve? No; eat better foods and just a bit less food overall (25-30% less). CR results in a multitude of health benefits, including reductions in abdominal fat mass, increased insulin sensitivity, and reduced levels of proinflammatory cytokines, reactive oxygen species, and atherosclerotic lipids in the blood. CR appears to both improve the resilience of synapses to metabolic and oxidative damage and modulate the total number, structure, and functional status of synapses. When

combined with exercise training, CR gave a synergistic effect and led to prevention of cognitive decline and upregulation of BDNF.

Redman LM, Ravussin E. (2011). Caloric restriction in humans: impact on physiological, psychological, and behavioral outcomes. *Antioxidants & Redox Signaling*. **14**, 275–287.

What to Eat: I eat only ocean-caught wild fish (never farm raised). I eat only eat beef or chicken that is raised healthy, without hormones. Potatoes; I eat one sweet potato a week. Add spinach, cauliflower, broccoli, hard cheeses and cabbage. Starches? I have maybe one Ramen or pasta dish a week. Fruits? Eat blueberries fresh or frozen. Choose water, green tea w/ no sugar in it (hot or cold). Greek yogurt is good only if it is plain. You will think more clearly, and you'll get and stay lean.

Keep your focus strong.

This is about the rest of your life. You have a choice to make, every day. If you have a problem with doing any of the things above, it's time to reflect on your life, your family and the values you hold.

DISCLAIMER: This resource is only intended to identify botanical and nutraceutical agents that may boost your immune system. It is not meant to recommend any treatments, nor have any of these been definitely proven effective against post-coronavirus "long-haul" symptoms. None of these practices are intended to be used in lieu of other recommended treatments. Always consult your physician or healthcare provider prior to initiation of any new intervention. You are responsible for your own decisions and health.

What Other Interventions are Available?

The following are some of the most common (and valuable) supplements and compounds. Each have evidence that they *may be of value* for your condition. Remember, the "Long Haul" syndrome" is fairly new to the medical/research world. Some of the evidence here is based on small to moderate samples (vs. large samples). These nutrients have shown value in supporting the immune system in your current fight. Other nutrients help "backstop" your system by supporting your stress response or being a micro-nutrient that is a co-factor to enable other nutrients to do better.

Choose carefully; **start at half** the suggested dosage (or use every other day) for the first week. Sometimes, different novel nutrients don't "play well" together. I have learned, with experimentation, to take some of my supplements AM, others in PM and others *between meals*. Between meals works if the directions say take only with a glass of water (vs. with a meal). You are building a fortress; the best immune system you've ever had! What matters is doing this on a regular basis, not what you try out for a day or so.



This next section is all driven by recent research. Many of the citations (but not all) are found in a two peer-reviewed journal articles: Evans JM, Luby R, Lukaczer D, Rountree R, Stone PM, Guilliams TG, Yanuck S, Messier H, Ramsdell K, Hanaway PJ. (2020). The Functional Medicine Approach to COVID-19: Virus-Specific Nutraceutical and Botanical Agents. *Integr Med (Encinitas)*.19,34-42. And, Ferreira, A. O., Polonini, H. C., & Dijkers, E. (2020). Postulated Adjuvant Therapeutic Strategies for COVID-19. *Journal of personalized medicine*, 10(3), 80.

1. **Amino Acids.** I take *Perfect Amino* by Body Health (2-5 capsules daily). This product gives me a protein balance for all I need. Specific amino acids may help more than others. Available from Amazon.
2. **N-Acetylcysteine (NAC).** Promotes glutathione production, which has been shown to be protective. In a six-month controlled clinical study, those receiving 600 mg NAC twice daily (vs. placebo), experienced significantly fewer influenza-like episodes and bed-ridden days.

Evans, et al., (2020). The Functional Medicine Approach to COVID-19: Virus-Specific Nutraceutical and Botanical Agents. *Integrative medicine (Encinitas, Calif.)*, 19(Suppl 1), 34–42.

3. **Ashwagandha.** This root extract enhances a person's capacity to handle stress. Ashwagandha (commonly referred to as winter cherry, Indian ginseng, or poison gooseberry) is an herbaceous plant from the Solanaceae family. Evidence indicates that Ashwagandha exerts anti-inflammatory and neuroprotective effects. Ashwagandha dosage is 300 mg/day, available from Amazon.

Sikandan A, Shinomiya T, Nagahara Y. (2018). Ashwagandha root extract exerts anti-inflammatory effects in HaCaT cells by inhibiting the MAPK/NF- κ B pathways and by regulating cytokines. *Int J Mol Med*. 42,425-434.

- 4. Black Chokeberry.** Chokeberry fruit has strong antioxidant and health-promoting potential as they reduce the occurrence of free radicals. I use 400 mg/day/Swanson Vitamins. Available from Amazon.

Sidor A, Gramza-Michałowska A. Black (2019). Chokeberry *Aronia melanocarpa* L.-A Qualitative Composition, Phenolic Profile and Antioxidant Potential. *Molecules*. 24,3710.

- 5. Blueberries.** Strong anti-oxidant either fresh or frozen. Evidence suggests that regular consumption of blueberries reduces a person's risk of developing cardiovascular disease, cancer, and type 2 diabetes via anti-oxidant qualities. I take 4 oz. about 3-4x/wk.

Stroganov S, Sumczynski D, Mlcek J, Jurikova T, Sochor J. (2015). Bioactive Compounds and Antioxidant Activity in Different Types of Berries. *Int J Mol Sci*. 16,24673-706. And Kalt, et al., 2020.

- 6. Caffeine and tyrosine.** There's clear, consistent evidence to support better cognitive performance in both. More specifically, caffeine improved attention, vigilance, and executive function. If you get the jitters, take caffeine *plus theanine* (100-200 mg). Tyrosine improved psychomotor and memory performance. (I take 1-2 capsules of both daily). Yes, from Amazon.

McLellan TM, Caldwell JA, Lieberman HR. (2016). A review of caffeine's effects on cognitive, physical and occupational performance. *Neurosci Biobehav Rev*. 71:294-312. Hase A, Jung SE, aan het Rot M. (2015). Behavioral and cognitive effects of tyrosine intake in healthy human adults. *Pharmacol Biochem Behav*. 133:1-6.

- 7. Cat's Claw Capsules.** Cats Claw (*Uncaria Tomentosa*). This calms an overactive immune system and boosts immune response. There's evidence that it can decrease inflammation and regulate immune system through the extension of lymphocyte survival via an anti-apoptotic mechanism. It has a wide range of properties from DNA repair to cancer, Alzheimer's and anti-aging repair. 90 Kosher Vegan Caps with 1000 mg. per day, available from Amazon.

Valerio JR L.G., F G.G. Toxicological Aspects of the South American Herbs Cat's Claw (*Uncaria tomentosa*) and Maca (*Lepidium meyenii*): A Critical Synopsis. *Toxicol. Rev*. 2005;24:11–35. Cheng A.C., Jian C.B., Huang Y.T., Lai C.S., Hsu P.C., Pan M.H. Induction of apoptosis by *Uncaria tomentosa* through reactive oxygen species production, cytochrome c release, and caspases activation in human leukemia cells. *Food Chem. Toxicol*. 2007;45:2206–2218. European Medicines Agency *Assessment Report on Uncaria tomentosa (Wild. ex Schult.) DC., cortex*. European Medicines Agency; London, UK: 2015.

- 8. Chocolate.** Eat dark only (85% cocoa, Moser bars) I eat 2-oz/day.

Gomez-Pinilla F, Tyagi E. (2013). Diet and cognition: interplay between cell metabolism and neuronal plasticity. *Current Opinion in Clinical Nutrition and Metabolic Care*. 16,726–733

- 9. Chromium.** It is critically valuable as it works well to reduce blood sugar levels and help resist inflammation. Available from Amazon.

Panchal SK, Wanyonyi S, Brown L. (2017). Selenium, Vanadium, and Chromium as Micronutrients to Improve Metabolic Syndrome. *Curr Hypertens Rep*.19 (3):10.

10. **CoQ10.** Reduces inflammation. Take 300 mg/day (Take Enhanced PQQ w/ Ubiquinol). Available from Amazon.

Brauner, et al. (2014). Markers of innate immune activity in patients with type 1 and type 2 diabetes mellitus and the effect of the anti-oxidant coenzyme Q10 on inflammatory activity. *Clin Exp Immunol.* 177,478-82.

11. **Creatine.** (2-5 gm/day in a smoothie). Supports oxygen transfer and muscle recovery. I buy *Optimum Nutrition Micronized Creatine.* Amazon.

Kazak L, Cohen P. (2020). Creatine metabolism: energy homeostasis, immunity and cancer biology. *Nat Rev Endocrinol.* 16,421-436.

12. **Curcumin.** It has been shown to modulate the NLRP3 inflammasome, and curcumin can target the SARS-CoV-2 to reduce viral replication. I take 300-500 mg./2x /day with black pepper. Amazon.

Evans, et al., (2020). The Functional Medicine Approach to COVID-19: Virus-Specific Nutraceutical and Botanical Agents. *Integrative medicine (Encinitas, Calif.)*, 19(Suppl 1), 34–42.

13. **Elderberry.** Can favorably modulate viral-induced pathological cellular processes. (500 mg.). Available from Amazon.

Evans, et al., (2020). The Functional Medicine Approach to COVID-19: Virus-Specific Nutraceutical and Botanical Agents. *Integrative medicine (Encinitas, Calif.)*, 19(Suppl 1), 34–42.

14. **Glutathione** can support the reduction of oxidative stressors. In its reduced form (GSH) and glutathione peroxidase (GPx) are the most essential antioxidants. It can have low absorption as a supplement. Eat more of what triggers the production of it: Curcumin, Selenium, Vitamin C & E and N-acetylcysteine. Or, typical daily dose is 250-1000/mg/day.

Richie JP Jr, Nichenametla S, Neidig W, Calcagnotto A, Haley JS, Schell TD, Muscat JE. (2015). Randomized controlled trial of oral glutathione supplementation on body stores of glutathione. *Eur J Nutr.* 54, 251-63. And, Bunitskaya Y., Gurinovich R. Highlights of COVID-19 Pathogenesis. Insights into Oxidative Damage. Online: https://www.researchgate.net/publication/341111141_Highlights_of_COVID-19_pathogenesis_Insights_into_Oxidative_Damage.

15. **Green tea.** In addition to inflammation and potentially targets the SARS-CoV-2 to reduce viral replication, has also been shown to prevent viral influenza in healthcare workers. Drink (1-2 cups/day).

Evans, et al., (2020). The Functional Medicine Approach to COVID-19: Virus-Specific Nutraceutical and Botanical Agents. *Integrative medicine (Encinitas, Calif.)*, 19(Suppl 1), 34–42.

16. **Imuno.[®]** (100 mg.) From physicians only. It plays a role in avoiding immune hyperresponsiveness and hyperinflammatory condition. It can

increase innate defense against invasive microbial/viral infection and inflammation.

Krishnaveni M. (2013). A review on transfer factor an immune modulator. *Drug Invent. Today.* 5,153–156

17. **L-Carnosine.** This is a naturally occurring amino acid. It is also a powerful regulator of your immune system. Dosage is 2 X 500 mg. per day. It helps calm an overactive immune system and works as an antioxidant and free radical scavenger. Available from Amazon.

Fresta CG, et al., (2020). Modulation of Pro-Oxidant and Pro-Inflammatory Activities of M1 Macrophages by the Natural Dipeptide Carnosine. *Int J Mol Sci.* 21(3):776.

18. **Lithium.** Levels of ingested lithium appear to have strong effects on human well-being across the spectrum of normal health, and susceptibility to important diseases, such as mood disorders and neurodegenerative disease. I take one tablet daily (120 mg.). Use *Lithium Orotate* from Advanced Research. Available from Amazon.

Fernandes et al., (2019). Lithium is able to minimize olanzapine oxidative-inflammatory induction on macrophage cells. *PLoS One.* 14(1):e0209223.

19. **Mushrooms.** Edible fungi are vegetables in the human diet. They are rich sources of many vitamins and minerals, including B vitamins, potassium, and selenium. Mushrooms (Reishi, Shiitake and Maitake) contain a variety of bioactive compounds, including the antioxidant molecule glutathione. Get *5 Defenders* or *Peak O2* from Amazon.

Muszyńska B, Grzywacz-Kisielewska A, Kała K, Gdula-Argasińska J. (2018). Anti-inflammatory properties of edible mushrooms: A review. *Food Chem.* 15,243:373-381.

20. **Miodesin® (800 mg. daily).** From physicians only. It is a co-processed, anti-inflammatory blend of natural origin compounds of registered proportions. Has anti-inflammatory properties; inhibits the release of cytokines, chemokines, the expression of inflammatory enzymes and chemokines. It may contribute to reducing the oxidative stress and to enhance phagocytosis.

Maia H., Saback W., Haddad C., Sitya P.R. (2018). Treatment of Endometriosis and Leiomyoma with the Association of Miodesin and Gestrinone in Pentravan Through the Vaginal Route. *J. Clin. Rev. Case Rep.* 3:1–5.

21. **Melatonin.** It has been shown to have an inhibitory effect on the NLRP3 inflammasome. There are two recent studies proposing the use of melatonin as a therapeutic agent in the treatment of patients with COVID-19. I take 3mg. 3x/wk. Available from Amazon.

Evans, et al., (2020). The Functional Medicine Approach to COVID-19: Virus-Specific Nutraceutical and Botanical Agents. *Integrative medicine (Encinitas, Calif.)*, 19(Suppl 1), 34–42.

22. Magnesium. Intake of magnesium gluconate is associated with reduced body mass index, body fat percentage, as well as reducing inflammatory biomarkers and depressive symptoms. 400 mg./day.

Abiri B, Vafa M. (2020). Effects of vitamin D and/or magnesium supplementation on mood, serum levels of BDNF, inflammatory biomarkers, and SIRT1 in obese women: a study protocol for a double-blind, randomized, placebo-controlled trial. *Trials*. 21(1):225.

23. N-Acetylcysteine. This promotes glutathione production, which has been shown to be protective against influenza. In a little-noticed six-month controlled clinical study enrolling 262 primarily elderly subjects, those receiving 600 mg NAC twice daily, as opposed to those receiving placebo, experienced significantly fewer influenza-like episodes and less days of bed confinement. Available from Amazon, 600 mg./day.

Skvarc DR, Dean OM, Byrne LK, Gray L, Lane S, Lewis M, Fernandes BS, Berk M, Marriott A. The effect of N-acetylcysteine (NAC) on human cognition - A systematic review. *Neurosci Biobehav Rev*. 78,44-56.

24. Omega-3 fatty acids. These can increase neurogenesis (new brain cells). I eat fresh caught salmon from Alaska weekly. These essential fats play critical roles in the development and function of the central nervous system throughout life. They are integral to cell membranes and have antioxidant and anti-inflammatory effects. But that's not all. When trauma patients received omega-3 fatty acid-rich fish oil supplements, their levels of pro-BDNF (a precursor to BDNF) were nearly five times higher than in those who received a placebo. A bonus: Those with higher pro-BDNF levels were less likely to develop depression. I take Nordic Naturals Ultimate Omega 1280 mg. 2x/day from Amazon.

Stavrinou PS, Andreou E, Aphas G, Pantzaris M, Ioannou M, Patrikios IS, Giannaki CD. (2020). The Effects of a 6-Month High Dose Omega-3 and Omega-6 Polyunsaturated Fatty Acids and Antioxidant Vitamins Supplementation on Cognitive Function and Functional Capacity in Older Adults with Mild Cognitive Impairment. *Nutrients*. 12, 325.

25. Probiotics. There is a strong mind/body connection between compounds that regulate the immune system and your gut. BDNF levels live in the gut microbiome; that's the collection of microorganisms that live in the human digestive tract. Consider daily probiotics containing *Lactobacillus* (yogurt), Kombucha tea, miso, pickled vegetables and sauerkraut. These help BDNF levels increase, and as they go up, they showed BDNF-dose-dependent improvements in attention, working

memory, and verbal memory. I have learned to eat sauerkraut daily.

Azad MAK, Sarker M, Wan D. (2018). Immunomodulatory Effects of Probiotics on Cytokine Profiles. *Biomed Res Int.* 2018;8063647.

- 26. PQQ (pyrroloquinoline quinone).** This has growth-promoting, anti-oxidative action, and neuroprotective function. PQQ enhances of Nerve Growth Factor production. This protein (composed of 118 amino acid residues), is a neurotrophic factor required for the development and maintenance of peripheral sympathetic and brain's sensory neurons. Dosage: 100 mg/day.

Akagawa M, Nakano M, Ikemoto K. (2016). Recent progress in studies on the health benefits of pyrroloquinoline quinone. *Biosci Biotechnol Biochem.* 80,13-22.

- 27. Quercetin.** It has been shown to have antiviral effects against both RNA (e.g., influenza and coronavirus) and DNA viruses (e.g., herpesvirus). Quercetin has a pleiotropic role as an antioxidant and anti-inflammatory, modulating signaling pathways that are associated with post-transcriptional modulators affecting post-viral healing. Supplements available from Amazon; 500 mg./day.

Evans, et al., (2020). The Functional Medicine Approach to COVID-19: Virus-Specific Nutraceutical and Botanical Agents. *Integrative medicine (Encinitas, Calif.)*, 19(Suppl 1), 34–42.

- 28. Resveratrol.** As a naturally occurring polyphenol, it shows many beneficial health effects. It has been shown to modulate the NLRP3 inflammasome. In addition, resveratrol was shown to have in vitro activity against COVID. Dosage: 1500 -2000 mg/day. Amazon.

Malaguarrera L. (2019). Influence of resveratrol on the immune response. *Nutrients.* 2019;11:946. doi: 10.3390/nu11050946.
Yang Y., Li S., Yang Q., Shi Y., Zheng M., Liu Y., Chen F., Song G., Xu H., Wan T., et al. Resveratrol reduces the proinflammatory effects and lipopolysaccharide- induced expression of HMGB1 and TLR4 in RAW264.7 *Cell. Physiol. Biochem.* 2014;33:1283–1292

- 29. Selenium.** It also has potential to help in the prevention and control of RNA viruses by amplifying the signaling functions of TLR7. Supports optimal innate and adaptative immune response, as it stimulates T helper lymphocytes, cytotoxic T and NK cells, and macrophage phagocytosis. Dosage: 40-60 mgs/day.

Hoffman P.R., Berry M.J. (2008). The influence of selenium on immune responses. *Mol. Nutr. Food Res.* 52,1273–1280.

- 30. Spirulina.** Daily supplementation can play a role in macrophage activation. It stimulates the immune system by increasing phagocytic activity of macrophages which can lead to increased amounts of Natural

Killer cells in tissues, which support immune health.

Khan Z., Bhadouria P., Bisen P. Nutritional and Therapeutic Potential of Spirulina. *Curr. Pharm. Biotechnol.* 2005;6:373–379.

31. **Sulforaphane.** It is a bioactive compound derived from broccoli sprouts. Human studies show an incredible and highly beneficial cellular response. It has properties that can support chronic disease prevention and it increases glutathione levels in the brain (that reduces brain fog). I also eat kale, broccoli or cauliflower 4x/wk. I take Avmacol 4-6X/wk. (that's the optimal brand). Check out: chemoprotectioncenter.org.

Yagishita Y, Fahey JW, Dinkova-Kostova AT, Kensler TW. (2019). Broccoli or Sulforaphane: Is It the Source or Dose That Matters? *Molecules.* 24,3593.

32. **Virgin Olive Oil** consumption improves cognition in adults with mild cognitive impairment and may delay chronic cognitive problems.

Martínez-Lapiscina EH, Clavero P, Toledo E, San Julián B, Sanchez-Tainta A, Corella D, Lamuela-Raventós RM, Martínez JA, Martínez-González MÁ. (2013). Virgin olive oil supplementation and long-term cognition: the PREDIMED-NAVARRA randomized, trial. *J Nutr Health Aging.* 17,544-52.

33. **Vitamin A** is a micronutrient that is crucial for maintaining vision, promoting growth and development, and protecting epithelium and mucus integrity in the body. Vitamin A is known as an anti-inflammation vitamin because of its critical role in enhancing immune function. Vitamin A is involved in the development of the immune system and plays regulatory roles in cellular immune responses and humoral immune processes through the modulation of T helper cells, sIgA, and cytokine production. Suggested: 3,000 mcg/day.

Evans, et al., (2020). The Functional Medicine Approach to COVID-19: Virus-Specific Nutraceutical and Botanical Agents. *Integrative medicine (Encinitas, Calif.)*, 19(Suppl 1), 34–42.

34. **Vitamins B.** Support for cognitive functions. *Active Complex* from Integrative therapeutics (2x/day). Or, NatureMade Super B-Complex.

Smith AD, Smith SM, de Jager CA, Whitbread, et al., (2010). Homocysteine-lowering by B vitamins slows the rate of accelerated brain atrophy in mild cognitive impairment: a randomized controlled trial. *PLoS One.* 5(9):e12244.

35. **Vitamin C** is found in high concentrations in the brain, especially in the hippocampus and frontal cortex regions – areas that are important for memory consolidation, learning, and executive function. It can improve the functionality of immune system, reducing the severity of infections and its symptoms through the enhancement of T-cell and NK cell function and proliferation. It is able to both prevent and treat respiratory and systemic infections.

High dietary intake of vitamin C-rich fruits and vegetables produce C concentrations of around 80 micromoles per liter or less. The bioavailability of vitamin C depends on type, frequency and dose dependent. Even with supplemental oral intake of 3 grams, taken six times a day, plasma vitamin C concentrations peak out at 220 micromoles. But *the form* of vitamin C impacts bioavailability, too. I take 2-4 gms. daily of *Liposomal Vitamin C* (Wholesome Wellness).

Carr A.C., Maggini S. Vitamin C and immune function. *Nutrients*. 2017;9:1211. Aranow C. Vitamin D and the immune system. *J. Investig. Med.* 2011;59:881–886.

36. **Vitamin D3.** Activated Vitamin D3 is a steroid hormone, and an immune system modulator that reduces the expression of inflammatory cytokines and increases macrophage function. Vitamin D also stimulates the expression of potent antimicrobial peptides (AMPs), which exist in neutrophils, monocytes, natural killer cells, and epithelial cells of the respiratory tract. Vitamin D increases anti-pathogen peptides through defenses and has a dual effect for suppressing superinfection. I take this supplement *and* get out in the sun 4-7X a week for 15 min./day. Take 5,000 IU for each day.

Grant W.B., Lahore H., McDonnell S.L., Baggerly C.A., French C.B., Aliano J.L., Bhattoa H.P. Vitamin D Supplementation Could Prevent and Treat Influenza, Coronavirus, and Pneumonia Infections. *Preprints*. 2020;12:988. And, Dalan R., Liew H., Tan W.K.A., Chew D.E.K., Leow M.K.S. (2014). Vitamin D and the endothelium: Basic, translational and clinical research updates. *IJC Metab. Endocr.* 4:4–17. And, Hansdottir S., Monick M.M. Vitamin D Effects on Lung Immunity and Respiratory Diseases. *Vitam. Horm.* 2011;86:217–237. And, Daneshkhah A., Eshein A., Subramanian H., Roy H.K., Backman V. The Role of Vitamin D in Suppressing Cytokine Storm in COVID-19 Patients and Associated Mortality. *MedRxiv*. 2020

37. **Zinc.** It may both prevent viral infections and reduce their severity and duration. Increasing concentration of intracellular zinc inhibits the replication of coronavirus. Supplement with 30-50 mg. daily.

te Velthuis A.J.W., van den Worm S.H.E., Sims A.C., Baric R.S., Snijder E.J., van Hemert M.J. (2010). Zn²⁺ inhibits coronavirus and arterivirus RNA polymerase activity in vitro and zinc ionophores block the replication of these viruses in cell culture. *PLoS Pathog.*6:e1001176.

Key Medical Resources

Baig AM. (2020). Deleterious Outcomes in Long-Hauler COVID-19: The Effects of SARS-CoV-2 on the CNS in Chronic COVID Syndrome. *ACS Chem Neurosci.* 11, 4017-4020.

Cardone M, Yano M, Rosenberg AS, Puig M. (2020). Lessons Learned to Date on COVID-19 Hyperinflammatory Syndrome: Considerations for Interventions to Mitigate SARS-CoV-2 Viral Infection and Detrimental Hyperinflammation. *Front Immunol.* 29,1131.

Carfi A., Bernabei R., Landi F., C.-P.-A.C.S.G. (2020). Gemelli Against Persistent symptoms in patients after acute COVID-19. *JAMA.* 324, 603–605.

Evans, J. M., Luby, R., Lukaczer, D., Rountree, R., Stone, P. M., Guilliams, T. G., Yanuck, S., Messier, H., Ramsdell, K., & Hanaway, P. J. (2020). The Functional Medicine Approach to COVID-19: Virus-Specific Nutraceutical and Botanical Agents. *Integrative medicine (Encinitas, Calif.)*, 19(Suppl 1), 34–42.

Kingstone T, Taylor AK, O'Donnell CA, Atherton H, Blane DN, Chew-Graham CA. (2020). Finding the 'right' GP: a qualitative study of the experiences of people with long-COVID. *BJGP Open.* 4(5):

Marshall M. (2020).The lasting misery of coronavirus long-haulers. *Nature.* 585,339-341.

Schijns V, Lavelle EC. (2020). Prevention and treatment of COVID-19 disease by controlled modulation of innate immunity. *Eur J Immunol.* 50,932-938.

Walitt B, Bartrum E. (2021). A clinical primer for the expected and potential post-COVID-19 syndromes. *Pain Rep.* 6(1):e887.

Keep Reading; Two More Pages!

How to Implement the Changes

An activist said, “I’ve met with [NIH Director] Francis Collins. I’ve called Tony Fauci, and state senators. We still have no FDA-approved drugs, no systems of care. We only have 10 to 15 ME/CFS medical experts in the country. We all want our lives back, and we want this broken system fixed.” It usually takes some strong motivation or courage to take the first step. But the one who succeeds fosters the discipline *and makes the habit to take the next one*. And the next step. For today, this is it.

It is time for implementation of a new habit. There are many, many ways to create lasting behavioral change. The tools include:

1) Social accountability. Go to: www.c19recoveryawareness.com/support. Set up 1-2 other friends or partners to each get vested in each of the other’s success. Be in contact daily or weekly. Celebrate successes.

2) Use a habit app. There only three with clear evidence that they work: woopmylife.org OR Beeminder OR Habitica. Only use a habit app **if** you already use your smart phone for many other lifestyle nudges. Otherwise these be too inconvenient for you.

3) Habit stacking. Find an existing habit that happens near the time you want to add a new habit. Example: you check your email daily, so just add a new habit after that. Get up and walk for 3-5 min. Clear your head and repeat your blessings and gritudes. In this case, your existing habit was the email check. The “stacked-on” habit was your new de-stressor. Or, once you finish a dinner meal, create a new ritual. first thing to do is brush your teeth. That serves as a “palate cleanser” and it reduces your urge to have desserts.

If you *must have* (?) a sweet treat, after dinner, and if you like chocolate, buy the boxed 6 Pack with 85% Cocoa Dark Chocolate. It’s a Moser Roth Fine German Chocolate Bar from Amazon. Each bar within the box has 5 individually wrapped bars inside. Eat one mini bar and go brush your teeth. Your calories and sugar are low, and your brain feels great.

4) Habit-building. This 9-step habit builder below can be used anywhere for nearly any habit. It takes about ten minutes to set up, but it is thorough and nearly fool-proof. Print this next page out and charge ahead. *One more page and it’s the most valuable one!*

Your feedback is appreciated: Email me: eric@jensenlearning.com Thank you.

The 9-Step Crush-It Habit Builder®

1. Choice (ensure it is your own idea). What is the action, that you chose, that you want to become a habit?

2. Buy-in (buy into the relevancy, the need and urgency). Why is it important to you (and urgent) to begin this new action now?

3. Shift and ensure your Identity ("I am one who does **THIS** task"). What identity do you need to have to ensure that it guards and affirms this habit?

4. Craft and Shrink the change (start with a 30" to 3 min. change). What starting step could you begin with that would get this habit going?

5. Obstacles - Determine what obstacles may disrupt optimal implementation and find a way to mitigate them. That's your "Plan B." Make plans to counter the potential problems (fire drill, visitor, you forgot your cue, interruptions, etc.). Write them out and plug them into the next step.

6. Write out the steps of the activity *Have staff process and plan for how they could do it, too. Re-read the steps to ensure the habit works.*

7. Create a Cue or Trigger for the habit. Simple ones could be a time on your smartphone or school clock, a Post-It reminder, the end of another action or habit, an action by a student or staff, a bell, an opening or closing of a tablet, mobile device or the laptop, etc.

8. Create a Tracking Tool (keep accountability & rewards as you're making changes)

9. Set up Rewards. Many habit rewards work well with simply XXXs on a paper calendar. Others move tokens from one jar to another, some like stickers, or digital icons. If a sweet treat works, go for it or use your student's applause.
