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COVID-19 AND THE CORONAVIRUSES

The illness went on and on. The symptoms changed, it was like an advent calendar, every day there was a surprise, something new. A muggy head; acutely painful calf; upset stomach; tinnitus; pins and needles; aching all over; breathlessness; dizziness; arthritis in my hands; weird sensation in the skin with synthetic materials. Gentle exercise or walking made me worse—I would feel absolutely dreadful the next day.

—Paul Garner, professor of infectious diseases, Liverpool School of Tropical Medicine

It's like nothing I've ever seen before. **—Nick Caputo, MD**

COVID is here to stay. **—Thomas Frieden, MD, former head of the CDC**

No one knows how many coronaviruses there are, perhaps hundreds, perhaps thousands. Only seven (at this time) are known to infect people. Four of those (such as one form of the common cold) usually cause only mild to moderate infections. Three are far more serious. They are all members of the SARS group: the original SARS coronavirus (an acronym for Sudden Acute Respiratory Syndrome coronavirus, a.k.a. SARS-CoV, or SARS-CoV-1), emerged in November of 2002; MERS coronavirus (an acronym for Middle East Respiratory Syndrome coronavirus, a.k.a. MERS-CoV), which was identified in early fall of 2012 (and which is spread mostly by camels); and SARS-CoV-2 (a.k.a. Covid-19), which emerged in late fall or early winter of 2019.

SARS-CoV-1 is, in its impacts in the body, very similar to acute influenza and at first was thought to be an emerging influenzal strain. The

disease was characterized by fever followed by respiratory symptoms and, ultimately for some of the infected, progressive respiratory failure leading to death. Many of those who recovered from the acute phase suffered long-term physical damage from the pathogen's effects on, for instance, the lungs, liver, and kidneys. The same was found to be true of MERS. Eventually researchers found that SARS-CoV-1 was in fact a coronavirus and that it had jumped species . . . into us. Later the same was found to be true of MERS.

SARS-CoV-1 spread to 26 countries within a few months of emergence, carried primarily by travelers who were infected. But for some reason (there are lots of guesses) it disappeared sometime in 2004. MERS-CoV is still around but has remained pretty much limited to the Middle East. But SARS-CoV-2 has neither disappeared nor limited its range. On March 11, 2020, the World Health Organization declared it a global pandemic.

SARS-CoV-2

I am writing this in March of 2021. The coronavirus pandemic is still ongoing; there is no clear end in sight (though there are hopes that by spring of 2022 things will be back to normal). Despite early successes, there has been a viral resurgence in many countries that believed they had it under control. Much has been learned about SARS-CoV-2 since the pandemic began but there is still a great deal more to learn. Nevertheless, even in this short time, herbal protocols have been found to help; the ones that follow this lengthy discussion of SARS-CoV-2 (see page 97) are based on a depth understanding of how the virus infects people and what it then does in the body, and, as well, which plant medicines can subvert those processes and help protect and restore health. (A year of feedback on these protocols has shown a 95 percent success rate in preventing severe symptoms and shortening the duration of illness.)

To begin with, while SARS-CoV-2 is an acronym, it is also known as Covid-19 (and sometimes as just *the* coronavirus or even SARS-2), which does make things confusing. Regrettably, Covid-19 is also an acronym. It stands for **CO**rona**VI**rus **D**isease of 20**19**, usually written

COVID-19 (but also Covid-19). (It doesn't mean that there were 18 Covids before this one.)

Again, SARS-CoV-2 is a coronavirus. Coronaviruses are some of the largest viruses known. They possess some important differences to our most familiar virus—influenza. With SARS-CoV-2, one primary difference is that it has a very low mutation rate. (Influenza mutates around four times faster than SARS-CoV-2.) Nevertheless, problems have arisen.

A Rather Frightening Look at What Covid-19 Infection Does to the Body

This particular virus, it is becoming clear, is far more dangerous than was first believed. It is also a great deal more aggressive than influenza, to which it has been erroneously compared. And further, it is far more complex and subtle in its actions and much more damaging to the human body during infection than any pandemic respiratory pathogen since 1918. It combines the behavior of stealth pathogens and their associated systemic effects (similarly to organisms such as *Borrelia*, i.e., Lyme disease) with that of some of the more deadly forms of influenza. While the virus is primarily thought of as a respiratory pathogen, it is becoming clear that the nose/mouth/lungs are merely the entry point for the organism. It often spreads outward from those locations, infecting and damaging a wide variety of organs in the body as it travels. This is especially true for those who show no symptoms of infection yet are positive for the virus.

At minimum, 30 percent of those infected have *no* fever, respiratory distress, or cough. They pass through all casual testing processes, are believed to be uninfected, and continue to spread the infection. Further, newer studies are finding that children, who tend to become less ill than adults, are far more commonly infected than was believed and have a far greater viral load in their upper respiratory system (e.g., the nose) than even those adults who are seriously ill do. (This is apparently true of the asymptomatic who are in their teens, 20s, and 30s as well.) It now appears that they are acting as asymptomatic spreaders of the infection.

At this point it is known that the lungs, kidneys, heart, brain, GI tract, skin, and blood cells/circulatory system are the main organs affected by

the organism. From 20 to 50 percent of people hospitalized for Covid-19 have some form of heart damage or arrhythmias. About 20 percent have skin rashes. Significant blood clotting is occurring throughout the body for many people and this is probably the most serious common problem. As Dr. Jeffrey Laurence, a hematologist at Weill Cornell Medicine in New York City, commented, "The number of clotting problems I'm seeing in the ICU, all related to Covid-19, is unprecedented. Blood clotting problems appear to be widespread in severe Covid" (Rettner, 2020). Worryingly, many people in their 20s, 30s, and 40s, without any other symptoms, also have this kind of clotting but it is only discovered after they have a severe heart attack or stroke (which may be brought on by physical exertion or may simply occur on a day that seems like any old day at all).

The virus's preferred attachment point is what are called angiotensin converting enzyme 2 (ACE-2) receptors on our bodies' cells. (I will go into more depth on this later.) Damage to the endothelial cells, which are high in ACE-2 receptors and which line blood vessels, veins, and arteries, is far more common than was suspected, even in those with mild or no symptoms. This is the main source of the clotting problems people experience—though the inflammatory cascade the virus initiates plays a part as well, as it often does in many different types of microbial infections.

In consequence, it's clear that in addition to the testing necessary to determine if people are infected, a blood test for D-dimer levels is crucial. D-dimer is a fibrin degradation product that is present in the blood after clots are degraded by fibrinolysis in the body. Levels of D-dimer in the blood give a good indication of how pervasive clotting is, especially in those with no symptoms. Without this, the only other test that can give an indication of problems is the use of an oximeter, which measures blood oxygen levels. Healthy readings should run around 96 to 98 percent. If those levels begin to decrease, it indicates problems in lung/blood oxygen exchange. (Oximeters are very inexpensive and can be ordered online—it is a very good idea to get one.)

Neurologists removing large clots from the brains of fairly young people infected with the virus have found that as fast as they remove the clots, more form. Many of those who have died from the virus have been found to have hundreds if not thousands of tiny blood clots throughout

the lungs and, many times, in other organs such as the brain and the kidneys.

Damage to the blood vessels close to the surface of the skin is the source of the rash that is now known to be relatively common, occurring in around 20 percent of those infected. Infection of the GI tract can present merely as mild gastrointestinal upset, transient or continuing diarrhea, bloody diarrhea, vomiting, and severe abdominal pain. Damage to the GI tract can be severe. (The virus infects the GI tract, in part, so it can spread through feces excretion.)

Diagnostic imaging of the GI tract of those infected with SARS-CoV-2 (even in those with no pulmonary symptoms) has found severe damage to the bowel in a number people who were admitted to hospitals. Extensive clotting has led to the loss of circulation to portions of the bowel (ischemia) with portions of the bowel becoming necrotic (dead) in consequence. As Rajesh Bhayana notes, "Some findings were typical of bowel ischemia, or dying bowel, and in those who had surgery we saw small vessel clots beside areas of dead bowel" (Palmer, 2020). There is no way, as yet, to determine how many people's bowels have been seriously affected; virtually no diagnostic imaging of this sort is being utilized at this point in time.

Half of the infected show signs of kidney damage with up to a third needing temporary or permanent dialysis. (Eighty-two percent of those with subsequent kidney damage had no history of renal problems.) Due to the extensive clotting the virus causes, dialysis catheters often clog with clots during treatment and have to be continually cleared from the machines. Kidney failure is a common contributing factor to death from the virus. The virus also infects the endothelial cells of the bladder; it extensively sheds viruses from this location, spreading in expressed urine. The infection in the bladder can lead to recurring urinary troubles such as bladder pain (cystitis) and frequent urination. Proteinuria, hematuria, and elevated serum creatine and urea nitrogen have all been reported as well (though in lesser numbers) and still occur for some postinfection "long haulers."

In the brain, excessive clotting is the source of the mild to severe strokes that sometimes occur. Some of the first signs of this are slurring of speech and difficulty walking. Serious strokes leading to necrotizing

hemorrhagic encephalopathy, incapacitation, and death are also being reported. But the impact on the neurological system can be far broader.

Neurological symptoms can run the gamut from mild to severe. Somewhere between one-third and one-half of those infected display some form of neurological effects. These can be as mild as loss of smell or taste, muscle weakness, headache, nerve pain, depressed levels of consciousness, dizziness, tingling/fizzing sensation, hair and scalp pain, confusion, and a sense of not being one's self or as serious as encephalitis, seizures, and long-term mental impairment.

This virus, like SARS-CoV-1, apparently attaches to olfactory neurons in the nose. To infect neurons the virus doesn't utilize ACE-2 but a different cellular receptor—CD147—and from there spreads to the brain. (There is some confusion, a.k.a. argument, in the literature as to whether or not neurons express ACE-2; some say yes, some say no, fisticuffs at 4 behind the playground.) It spreads outward from the olfactory bulb in the brain to regions closely affiliated with that initial site.

Once the virus accesses the brain cells, it begins to replicate in some while killing substantial numbers of nearby cells. Colloquially, it appears to "suck up all the oxygen nearby," thus causing hypoxia, and death, in neighboring cells. However, the cells in which the virus replicates survive, allowing further reproduction. Synaptic connections decline; as neuroscientist Alysson Muotri comments, "Days after infection and we already see a dramatic reduction in the amount of synapses" (A. Mandavilli, 2020).

Portions of the brain as well as the brainstem, spinal cord, and cerebral spinal fluid all show viral infection. Autopsies have found damaged brain neurons and multifocal lesions in the brainstem, cerebral white matter, and cerebellum. (Infection of the cardiorespiratory center in the medulla, which has been found to occur, is possibly the reason for sudden respiratory failure in a number of the infected. This may also explain the extremely odd circumstance where some of the infected present with blood oxygen levels as low as 50 percent, which should cause unconsciousness, but they show no signs of respiratory distress—a.k.a. "happy hypoxia.")

The virus has also been found to attach itself to another receptor on cells, neuropilin-1. This can substantially reduce the experience of pain during Covid-19 infection. During viral infections, vascular

endothelial growth factor A (VEGF-A) is often released. VEGF-A binds to neuropilin-1, generating hyperexcitability of neurons—and pain. By binding to neuropilin-1 the virus inhibits VEGF-A binding, which stops the hyperexcitability, thus inhibiting the pain response. Thus, people are infected but feel none of the normal range of pain effects that infection usually causes. In other words, they remain asymptomatic. Because the pain is suppressed, they go about their day, further spreading the virus.

There is no evidence yet of demyelination of the neural structures of the brain, something that often occurs with acute viral infections, but research into the neurological impacts of infection is in its early stages—such damage is often seen only weeks or months later. A number of specialists are suggesting that anyone who has had the disease have regular neurological monitoring, perhaps for as long as a year after infection.

Some of those who have recovered still show neurological deficits, which seems likely to be a continuing aspect of what is now becoming known as post-coronavirus syndrome (as are various forms of damage to the kidneys, GI tract, heart, and lungs).

Nearly all the infected show elevated liver enzymes and this can continue for months after apparent resolution of the infection. About one-third of those who become ill experience liver problems. The problems are usually mild but in some cases have led to severe hepatitis. The endothelial cells in the gallbladder ducts are particularly susceptible to infection by the virus, which leads to what is called cholangiocyte injury, a bile duct inflammatory condition that can cause severe damage. This is the most common serious liver problem. (Postinfection, the use of standardized milk thistle seed to protect the liver and normalize its functioning is probably a very good idea.)

The virus does circulate through the spleen and lymph system but there is no data yet on whether it damages that system, or the bones, or pancreas, and so on. Those struggling with post-coronavirus syndrome commonly report enlarged lymph nodes as a continuing problem.

It's becoming clear that the virus may play a far more serious role in the reproductive system than is currently thought to be the case. ACE-2 receptors are very high in both ovaries and testicles. They are also high in the uterus, endometrium, and vagina. ACE-2 expression also varies with the menstrual cycle and there is evidence that Covid-19 infection or post-coronavirus syndrome are causing alterations in that cycle. But

concerns are also arising that the damage to the female reproductive system might be far worse—that is, viral infection of the ovaries could affect fertility. Some specialists are now recommending that women practice birth control (or abstain from sex) during infection and for at least 8 months after infection clears. There is no way to know, at this point in time, the effects of the virus during the early stages of pregnancy but ACE-2 receptors are highly expressed in the placenta, which could lead to problems in fetal development.

In men, ACE-2 is highly expressed in the testes, in Leydig cells and Sertoli cells. ACE-2 is very high in spermatogonia—the early cells that later become sperm. And the virus has been found living quite happily in sperm. Sexual transmission is apparently common and can come via either the male or female. Orchitis (inflammation of the testicles) is a potential long-term problem (both from viral infection and so-called autoimmune orchitis). Free testosterone levels tend to be significantly lower in some men who are infected; there is growing evidence that infection of the testicles is damaging fertility. Emerging research continues to show a wide variety of negative, potentially long-term impacts on both female and male reproductive systems.

There are early indications that the virus is damaging endocrine function in the body—that is, upsetting its complex hormonal processes. Those experiencing long-term post-coronavirus syndrome have reported problems in endrocrine functioning, and at least one group of researchers (Mongioi et al., 2020) have expressed concern about possible long-term endocrine-metabolic problems after infection.

Musculoskeletal problems have also been reported by the infected as well as those struggling with postinfection problems. Muscle pain (myalgia) is common in around 60 percent of the infected, and arthralgia (joint pain) in around one-third. Many people, postinfection, continue to experience this, usually on a cyclical pattern.

And, of course, infection and damage to the lungs can be extreme. The long list of complications that can occur in the body and its organs, both short and long term, are explored in the various sections that follow.

Similarly to borrelial infections, early suspicions are arising that the virus may sequester itself in protected locations in the body only to reemerge later, after treatment has ceased and the infected person is considered cured.

There are scores of people now, in the United States, in the United Kingdom, and throughout the world, who appear to have recovered only to "relapse" days, weeks, or even months later. Further, to make things worse, the symptom picture continually changes, sometimes with every resurgence. As Paul Garner, a professor of infectious diseases who himself experienced these types of relapses, comments, "Every day there was a surprise, something new. . . . I spoke to others experiencing weird symptoms, which were often discounted by those around them as anxiety, making them doubt themselves." (This is typical of those with recurring stealth-type infections—as many in the Lyme community have discovered. They seem better, the disease resurges, fatigue and other symptoms recur, and everyone, including their doctors, default to "it's all in your head." This is known as gaslighting.)

As he goes on to say:

> The least helpful comments were from people who explained to me that I had post viral fatigue. I knew this was wrong. There was a pattern in that period from two weeks to six weeks: feeling absolutely dreadful during the day; sleep heavily, waking with the bed drenched in sweat; getting up with a blinding headache, receding during the day, turning me into a battered ragdoll in the evening.
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> I joined a Facebook page (Covid19 Support Group (have it/had it)) full of people with these stories, some from the UK, some from the US. People suffering from the disease, but not believing their symptoms were real; their families thinking the symptoms were anxiety; employers telling people they had to return to work, as the two weeks for the illness was up. And the posts reflect this "I thought I was going crazy for not getting better in their time frame"; "the doctor said there is zero reason to believe it lasts this long." And too, people report that their families do not believe their ever changing symptoms, that it is psychological, it is the stress. (Garner, 2020)

As Luke Harding reports, "According to the latest research, about one in 20 Covid patients experience long-term on-off symptoms. It's unclear whether long-term means two months, or three or longer. [Note: Emerging data indicates it may be much longer.] The best parallel is dengue fever, [Paul] Garner suggests—a 'ghastly' viral infection of the lymph nodes which he also contracted. 'Dengue comes and goes. It's like driving around with a handbrake on for six to nine months.'" Or, as Lynne Turner-Stokes, professor of rehabilitation medicine at King's College, London, puts it (in typically convoluted language), for a percentage of those infected there is a "recrudescence of symptomatology" (Harding, 2020). The virus, in these cases, may

be sequestering itself (as Lyme bacteria, and others, do) and then reemerging after treatment, or the organism may be generating a new form that the immune system does not recognize, or perhaps the immune system antibodies have become less effective over time. (There are "long haulers" who now have been ill for as long as 12 months.)

Some people are testing positive for months and never seem to throw off the infection. As reporter Roxanne Khamsi comments, "One doctor had multiple positive coronavirus tests 90 days out from her initial diagnosis." Some researchers are speculating that there might be people who remain infected for very long periods of time. Virologist Richard Randall, for example, comments that it's not impossible that there might be people who can remain infective for 6 months or even as long as a year. "Those people may act as seeds or reservoirs for the virus and potentially could be the source of a local outbreak. I am not saying it is happening for Covid-19 because the data's not there. But that happening would not be surprising" (Khamsi, 2020).

Newer viral research is indeed finding that many viruses can remain active in various locations in the body for many years. And some coronaviruses can remain active in test animals' liver and central nervous system for exceptionally long periods of time. Kenneth Witwer, a molecular biologist at Johns Hopkins University, thinks that SARS-CoV-2 sequesters itself: "I still think that this phenomenon is likely explained by a persistent cellular reservoir of low-level replication, not by residual virus particles." (Noninfective viral particles can lead to a positive PCR test.) As he notes, viral RNA degrades very quickly, and there is no other reason for it to be found for months after infection (and thus leading to a positive test) unless new viruses are releasing particles (Khamsi, 2020).

Despite the increasing evidence for viral sequestering, some are suggesting that such may not be the reason; it may be reinfection after cure. (This is not uncommon with coronaviruses.) This would mean that previous infection does not confer immunity or that it is of very short duration. (The current speculation by researchers is 3 months of immunity after infection.) Looking at other coronaviruses: For those that recovered from SARS-CoV-1, immunity lasted for 2 years; immunity from coronaviruses that cause the common cold fades in a year. No one knows how long immunity to SARS-CoV-2 will last. (In late April of 2020, the World Health Organization issued a statement that it

should *not* be assumed that previous infection would confer immunity to repeat infections. Currently, numerous countries are reporting reinfection after recovery, especially with the mutated variants.)

And if all this were not enough, a great many people (between 30 and 40 percent of those infected) have been found to be asymptomatic for the disease and yet be silent carriers. People have been known to carry and spread the virus for weeks before symptoms arise (if they ever do) and for up to 4 weeks after infection is thought to have cleared (and perhaps a great deal longer).

The true rates of infection and death from the virus are not yet known and probably won't be known for 1 to 2 years. The reasons actual figures can't be known for so long is due to a variety of factors. Those are: early, erroneous beliefs about the virus and what it does in the body, very poor tests, low testing rates, and in the United States, regrettably, the CDC criteria for both infection and death, which nearly always are, and in this instance very much are, far too conservative and limited in scope.

Low testing rates (in the United States and in a number of other countries) give a false picture of infection in the general population. Figures change weekly, often in response to complex research papers that are utilizing various forms of statistical analysis. Few of them agree. I have seen figures speculating that true infection rates are ten times official numbers; others insist it is one thousand times official numbers. Death rates range from 0.05 percent in Singapore to 29 percent in Yemen.

While the elderly (due to simple aging of the body, its immune system, and its organs) and those with underlying conditions (obesity, diabetes, etc.) or immune dysfunction are the most likely groups of people to die from the virus, significant numbers of people in their late 20s, 30s, and 40s are also succumbing to the disease. Far more, in fact, than first thought. (Children of all ages are far more susceptible to infection than first believed, and while rates are low, death is occurring in this group as well.) There are two main reasons for death rates being far higher than is currently thought—though at root it comes down to the same thing, lack of testing.

The first is that, because of its system-wide impacts the virus is causing a great many heart attacks, strokes, and incidences of kidney failure. Unless those who die from causes other than respiratory failure

are tested for coronavirus, the listed cause of death is going to be incorrect. Secondly, a great many people are dying at home. Few of them are being tested for coronavirus. In fact, until recently, unless they had previously been tested for coronavirus and found positive, a death at home was not considered to be coronavirus related.

It is helpful here to look at normal background deaths at home in New York City and deaths at home during the pandemic. Normal deaths at home in that city average around 25 per day. During this pandemic early studies have found daily deaths running from 150 to 275, depending on the week and how diligently apartments are being checked. The true coronavirus death rate is much higher than believed, something that is now being widely recognized. (Most sources are now accepting that true death rates are at minimum 30 percent higher than official figures.)

Covid-19 Mutations

Somebody said that people in many rich countries have got used to thinking that they've conquered all infectious disease, and so there's this hubris about that, and I think that we found that hubris was more profound than we realized. We felt far too safe, and there was really quite a great degree of arrogance in there. . . . [Then] an old colonialist-thinking legacy [arose], discounting Asian science and experience, and that's a large part of what this whole theme is. Just that assumption that you are Americans or Europeans and know best over and over again. If this pandemic has taught us anything, it should be not to think that anymore, and yet, people keep doing it.

—Hilda Bastian, scientist, medical researcher, and health consumer advocate

Like all microbes, and most especially viruses, Sars-CoV-2 is a master of mixing its genome; it is highly adaptable. Viruses, when they move into large populations of people, enter a new ecological territory. They, as we do, learn the new terrain and adapt to it. Viruses are immeasurably older than we are; they have a great deal of experience altering their genomes to better survive in new ecological niches. It's become common among researchers to speak of viruses as having trouble reproducing identical copies of themselves. They say the viruses make "typos" or "copy-and-paste" errors or even that they engage in bad "proofreading." This makes the viruses seem rather stupid: "Oh, the poor things. Can't even copy themselves correctly." The truth is very different.

What is more ecologically accurate is that viruses are a form of swarm intelligence—the individual members are not the entity, the swarm is. One of the primary adaptation patterns the swarm uses is to generate millions of slightly different offspring very quickly in order to produce more highly adaptable forms. The viral swarm also possess the capacity to create new genomic forms through highly sophisticated examination and analysis of their new hosts' ecologies. They *respond* to our responses to them. And they do this in a number of ways.

Analysis of SARS-CoV-2 has found that it took up residence in a number of immunocompromised people around the world, learning a great deal from them in the process. The virus then recombined its genome, creating more adaptable forms that are better able to live within us. In one Boston hospital a 45-year-old severely immunocompromised man remained ill with the infection for 5 months. Doctors sequenced the virus from the beginning of his infection and found that more and more mutations occurred—21 by the end. The virus was experimenting with alterations in the spike protein to find the ones best suited to evade immune responses. After the man was given a new antibody drug, the virus immediately developed alterations to evade it. This exact same process occurred nearly simultaneously in countries throughout the world. As molecular epidemiologist Emma Hodcroft commented, "It becomes almost like a training course for how to live with the human immune system" (S. Zhang, January 18, 2021).

The virus has a plethora of other ways to create variations. Sometimes the virus utilizes the genomes of more adaptable "typo" forms, recombining several different ones in order to create better survivors. The virus also shares genomic sequences with other coronaviruses (such as the corona cold virus) that have already adapted to the human body. (This is especially worrying in that there are thousands of unknown coronaviruses that live in wild ecosystems. Developing a spike protein adaptation that allows easy human infection will, if shared, allow other members of the genus to infect us.) And our medical responses to them, including vaccines, also stimulate adaptation.

These are the main reasons that similar-to-identical variants have emerged, essentially simultaneously, throughout the world. When these variants meet each other in new hosts they innovate again. They share genomic information, creating even more adaptable variations. This is

a very ancient viral adaptation strategy. All microbes, despite what we were taught in school, are highly intelligent, and they have been surviving and adapting for far longer than our species has existed.

A significant number of variations (so-called mutations) emerged at the time of this writing, in the early months of 2021. There is every reason to expect this will be a continuing problem. The first three variations of serious concern in 2021 were the UK, the South African, and the Brazilian. But others soon emerged as well: the powerful California variant, another in New York, one in Spain, and still another in Brazil. The genomic innovations the variants possess are not identical, though at this point in time they are fairly close. Nevertheless, each possesses an alteration in their spike protein (called N501Y). This alteration allows the virus to attach to ACE-2 receptors more easily and more firmly, which makes infection more likely.

The wild or initial form of Covid-19 had a less sophisticated attachment method; the new ones are far more elegant. A bad analogy is that the virus (male) and the cell (female) form a kind of male/female attachment point. The fit wasn't perfect in the original form but it worked well enough. The immune system responded by creating an antibody that "capped" the spike on the virus (the condom), making it more difficult or impossible for the virus to attach itself. But in time the virus adapted itself to the cap (the new variants), altering the spike's shape so that it could not be capped by the antibody. At the same time a much firmer, tighter fit to the ACE-2 receptors occurred. Still other alterations made the virus significantly more transmissible. Viral loads in the infected are up to a thousand-fold higher. Further innovations in the South African and Brazilian variants (the E484K mutation) make them even more capable of avoiding immune system antibodies. The California variant is now known to be extremely transmissible as well, perhaps far more than the initial three variants. The variants are 40 to 70 percent more transmissible, and in some cause much more severe illness.

More troubling, previous infection does not confer immunity to the new variants. People in some areas of Brazil, having already survived infection from earlier forms, are now succumbing to infections from the new variant. The same dynamic appears to be playing out in South Africa. Again: *Previous infection is not conferring immunity*. Nor does donor plasma seem to work against the new variants.

The new variants are unfortunately increasing "exponentially" in the human population. The UK variant, which initially had accounted for only 1 to 4 percent of infections in the United States, had, within a month, surged to 30 to 40 percent. As Dr. Celine Gounder said on *CNN Newsroom* (March 6, 2021), "We are probably right now on the tipping point of another surge." A day later, in an appearance on NBC's *Meet the Press*, Michael Osterholm commented that we are in the "eye of the hurricane." He expects a dangerous upswing infections between early summer and fall 2021. This process—an upsurge, then a downswing, then an upsurge—is likely to continue indefinitely. Newer variants are going to emerge in an endless repeating cycle. The California variant is expected to make up 90 percent of infections on the West Coast by summer of 2021. It, like a number of the others, is far more contagious than earlier forms. As Paul Duprex at the Center for Vaccine Research at the University of Pittsburgh puts it, it was a mistake to "think that we are cleverer than evolution." Kevin McCarthy, also at Pittsburgh, comments, "We've been underestimating the capacity of the virus to evolve since the beginning of the pandemic" (Johnson, March 7, 2021).

The more people the virus infects worldwide, the more it learns, and the more successful variants it will create. Many researchers now believe that *herd immunity is unlikely*. Given the virus's adaptability and its very fast learning curve, the best case scenario is that it may be more accurate to think of it similarly to the flu virus, for which we require a new and different vaccination each year. As the *Washington Post* recently commented, "The pandemic continues. For how long? At this point, anyone giving a confident answer is guilty of hubris" (Achenbach, Cha, and Sellers, 2021).

SARS-CoV-2 is going to be with us for a very long time. The crucial question is, will we be able to adapt to it as well as it is adapting to us?

The Vaccines

[This same kind of arrogance is] happening with vaccines, especially thinking it's all about the vaccines of a few big EuroAmerican multinationals galloping to the world's rescue. One of the most fascinating stories is Cuba. I mean, there's this really interesting juxtaposition between Cuba and Canada, ironically. In Canada there's a debate about why did they let their capacity to produce vaccines dwindle away next to nothing. Cuba had the exact opposite. Cuba had to become self-sufficient

at pretty well everything, and that included producing drugs and producing medical teams. . . . They're going to have a massive amount more vaccine than they need. They're not going to have any trouble vaccinating their population with home-grown vaccines in 2021. . . . They're just going to be exporting masses and masses of vaccine.

—Hilda Bastian, scientist, medical researcher, and health consumer advocate

The first thing to understand is that despite common assumptions Covid-19 vaccines are not vaccines in the way most people think of them, that is, something like the measles vaccine, which prevents all future infection. More properly, they activate the immune system to enable it to better respond to the virus if exposed. For some people this means they will not be infected, while for others it means that they merely have a less severe infection. For others there will be less chance of death if they do become seriously ill. Regrettably, the vaccines that are now in use were designed for the original or wild form; they were not designed for the newer variants. While they, at this point in time, do offer some protection, emerging reports of infection in the vaccinated are becoming common throughout the world.

There are (apparently) some 240 different vaccines in development, none which look likely to provide permanent protection to the coronavirus group. Six vaccines are officially approved/authorized in various countries, 22 are in phase three trials, 23 are in phase two trials, 18 are in phase one. The approved/authorized vaccines are: the Moderna mRNA-1273 vaccine, the Pfizer-BioNTech BNT162b2 vaccine, the AstraZeneca AZD1222 vaccine, the Sinovac Biotech and Sinopharm vaccines from China, the GAM-COVID-Vac (Sputnik V) vaccine, the Novavax NVX-CoV2372 vaccine, and the Johnson & Johnson/Janssen Ad26.COV2.S vaccine.

The Pfizer and Moderna vaccines are made using messenger RNA (mRNA). This delivers a bit of genetic code (the spike protein) into the body, which stimulates the immune system to make antibodies to stop spike attachment. Johnson & Johnson used a different approach, creating what is called a viral vectored vaccine. In this version, a relatively benign adenovirus has been altered to carry the SARS-2 spike protein into the body, which, again, stimulates the immune system to produce antibodies. Pfizer is for people 16 and older, the others for 18 and older.

The Novavax vaccine delivers the actual spike protein (bioengineered via moth cells) into the body to stimulate an immune response.

It also has an additive that "soups up" the immune response—a saponin from the Chilean soapbark tree. (Technically it is considered to be adjuvanted recombinant protein nanoparticles.) The Sinovac Biotech and Sinopharm vaccines use an inactivated virus. This is similar to how the flu vaccine is made. However, in this instance there is some concern about the vaccine's safety, given the speed of the production, in that early trials with the inactivated dengue and respiratory syncytial virus vaccines caused serious side effects in large numbers of people. The Sputnik V and AstraZeneca vaccines are vector vaccines similar to the Johnson & Johnson vaccine. There is also a Sinofi/GlaxoSmithKline vaccine that is apparently somewhat similar to the Johnson & Johnson vaccine and may be available in late 2021 in the United States. And there are many others in use that just don't show up on the media radar. There are five coming out of Cuba, one in Thailand, and another from UNICEF.

Efficacy vs. Effectiveness

As usual, academicians' convoluted language (which the media endlessly repeats) has created confusion about how effective the vaccines are. "Effective" and "efficacy" are not the same thing. Pfizer and BioNTech say their vaccines have a 95 percent *efficacy* rate; Moderna's is 94.5 percent; Sputnik V is over 90 percent; Johnson & Johnson's single shot is (on average) 66 percent (but 85 percent against severe disease); Novavax is 89 percent but only 50 percent against the South African variant. The media have often translated this improperly, as in "Moderna's vaccine is 94.5 percent effective." Most people assume that if a vaccine is 95 percent effective, it means that 5 out of 100 people who receive that vaccine will get sick, and 95 will not. But there is a difference between efficacy and effectiveness, and in the real world it is a big difference.

Using the Pfizer vaccine as an example: There were 43,661 people recruited for the trials. They were split into two groups. One received a placebo, the other the vaccine. Then the researchers waited for 170 of those people to become ill—that is, to show symptoms. (Yes, a strange number; I have not been able to find the rationale for it, it was apparently a suggestion from a statistician as being the lowest meaningful number.) Then they looked at who got sick. Of the 170 people who became ill with Covid-19, 162 had received the placebo, and 8 had received the vaccine.

If people in the placebo and vaccine groups become ill in the same numbers, the efficacy of the vaccine is zero. If no people in the vaccine group get sick, then the efficacy is 100 percent. The 95 percent number represents a relation between the numbers of people who got sick in the placebo and vaccine groups, that is, 8 divided by 162, which gives you 0.05 (close enough), which is 5 percent. In other words, the number of people in the vaccine group who got sick is 5 percent of 162, and therefore the vaccine is 95 percent effective. This makes sense in the world researchers live in, not in the real world. It confuses people, but more concerning is the fact that these figures don't actually have anything to do with the real world.

These trials worked with a very limited number of people. In the real world, hundreds of millions of shots will be given (billions eventually, utilizing a variety of different vaccines). The larger group of people who get the vaccine will be much different in their health and genetic makeup than the volunteers in the trials. In consequence, the efficacy percentage (that is, the effectiveness) will be different in the real world; no one knows what it will actually be. Further, many people who become infected show no symptoms; this was true in the trials as well. But the trials counted only those people with symptoms. This is going to alter both efficacy and effectiveness percentages.

Four further points: 1) The shots only reduce the severity of the disease if you become infected; they do not prevent infections (as, for example, the smallpox vaccine does). They act more as a "dampener on the virus's ability to replicate inside you" (S. Zhang, February 9, 2021). Because the severity is reduced, the assumption is that there will be less chance of dying. (No one knows as yet if this is true; this was not examined in the initial trials.) 2) The shots are into muscle tissue. This stimulates overall immune responses but it doesn't necessarily stimulate immune responses in the nasal tissues, where the virus first takes hold. 3) Most of the vaccines stimulate antibody production. Antibody production falls over time, so that, again, shots may be necessary every 6 months to 1 year. (No one knows about this either.) 4) Unexpected side effects will also appear, and they often will be very different than those found during the trials. (This is true of *all* vaccines.)

Vaccine Side Effects

The major side effects of the vaccines (so far) appear to be pain (sometimes severe) at the site of the injection and overall feelings of having the flu for a few days (chills and fever, nausea, aches and pains, fatigue). People report that these are far more severe after a second injection (with the two-dose vaccines). However, reports are emerging (as of March 2021) that the range of side effects is far broader than was first imagined. Here's a list (which has been compiled from official government and pharmaceutical sources, media reports, and extensive personal communications): mild to severe allergic reactions (anaphylaxis); tremors (both transient and permanent); immune thrombocytopenia (very serious); Bell's palsy; headache (transient and continuing); constipation; diarrhea; jitteriness; odd taste in the mouth; alterations in menstrual flow and texture; dizziness; fatigue; high fever; severe joint pain; severe bruising and swelling at the site of injection; chills; tachycardia; seizures; severe nausea; vomiting; bone pain; slurred speech; facial numbness; pressure behind the eyes; paralysis of the body or limbs (sometimes extreme and long lasting); mental confusion (sometimes severe); hearing loss; extreme abdominal pain; swollen lymph nodes (a.k.a. lymphadenopathy, sometimes severe); loss of sight (temporary); acute appendicitis; passing out; mottling and cyanosis of the extremities; acute pancreatitis; stroke; heart attack; angioedema; neurological deficits (various); hospitalization due to side effects; death. While some side effects present immediately, many physicians are reporting that there is often a delay between dose and side effects of up to 8 days.

Note: The CDC maintains a database of vaccine side effects that have been reported to the government (more are being reported all the time). You can find it by searching online for "Vaccine Adverse Event Reporting System." To access the data for Covid-19 vaccines, in the menu where the system asks you to select vaccine characteristics, select the option for Covid-19 vaccines. You can tailor your search by other factors, such as demographics, vaccine manufacturer, specific symptoms, et cetera, if you like.

Regrettably, government spokespeople, medical researchers, and media articles continue to downplay vaccine risks (when what is true at this point is that no one can know how many there are or how severe they are going to be). As an example: Despite instances of Bell's

palsy onset immediately after injection, some medical reports insist that because the number of palsy events is not larger than the normal percentage in the population, it has nothing to do with the vaccine. This is not doing anything to alleviate concern about side effects; quite the contrary.

It *is* true that only a small percentage of people are experiencing side effects when compared to the total number of doses given, but the fact remains that some people are having very serious reactions, some of them permanent. That it is rare does not appear to help those who become very ill ("Sorry, don't do no good, does it?"). As with all things you put in your body (pharmaceuticals or plants), every person should carefully examine their own state of health, what is known about the substance and its possible side effects, and their intuitive sense of the risks for them as an individual, and then decide for themselves how they wish to proceed.

I think when you have no commercial experience with a vaccine strategy and you're using that as a way to try to stop a new virus, there will be something of a learning curve. . . . I wish there was a little more humility from some of these companies. . . . You're only going to know about rare adverse events once these vaccines are out there, because even in a best-case scenario, they are tested on 20,000 or 30,000 people, not 20 million or 30 million people. So you are only going to know about a rare adverse event post-licensure. . . . When do you know enough to say that a vaccine's benefits outweigh its theoretical risks? You have to also make sure people know what you don't know. You don't know how long protection is going to last. You're only going to know that afterwards. You don't know whether it causes a rare side effect. You're only going to know that afterwards. . . . I just think we have to be honest and transparent about what we know and what we don't know.

—Paul Offit, MD, September 9, 2020

There is no other way to say this . . . what we are facing is serious. If the emerging picture of what the virus is doing is borne out, and if it continues to develop more sophistication with the human body and its immune responses, the human species is going to be in for a very bumpy ride.

There is little reason, at this point, to believe that this virus, as SARS did, will just fade away anytime soon. As Michael Osterholm has commented, "We will be dealing with this forever" (Rosenbaum, 2020). We will only discover what is true over time, perhaps only over several years. But we are, in fact, in a hell of a mess.

A Deeper Look at What the Organism Does in the Body

As time goes on, much more will be learned about the virus, its infection processes, and what it does in the body. Nevertheless, here is a pretty good view of what is happening. Knowing what the virus does and how it does what it does gives a good deal of information about how best to create and utilize sophisticated herbal (or medical) protocols to intervene in the process.

The virus is primarily spread through the air (inhalation) and transfers during touch between the infected and the noninfected. While it was originally assumed that the virus only traveled on large exhaled droplets (those from coughing, for instance), it is now known that it also attaches to tiny aerosol particles that are simply breathed out during respiration. This is why the virus infects certain cellular structures in the nose first—so it can use our breathing to spread from person to person.

Quite often there are no symptoms during the early stages of infection. On average, 30 to 40 percent of those who are infected have no symptoms. (Nevertheless, this is only an average—in a Boston homeless shelter, 147 people were infected but 88 percent of them had no symptoms; a poultry plant in Arkansas reported that 481 people were infected but 95 percent of them had no symptoms.)

Some people may begin to feel unwell within a few days, others can go weeks before they do, and some never feel ill. For most of the infected, there are 1 to 2 days during this nonsymptomatic period when the virus reproduces in tremendous numbers, promiscuously spreading in our exhalations (viral shedding). This ensures that, before symptoms appear, it can quickly spread throughout the population. It's a matter of timing. Someone who, during that particularly infectious period, immerses themself in a crowd can infect scores to hundreds of people in what are called superspreader events. (Restaurants, bars, nightclubs, concerts, convention gatherings, church services, warehouses, packed grocery stores, confined workspaces . . . all of these are perfect venues for superspreader events to occur. The more enclosed the space is, and the more poorly ventilated, the more that viral aerosols will circulate within the crowd.)

Infection can, of course, occur at any time during the course of the disease. (Asymptomatic people tend to shed longer, around 19 days versus 14 for the symptomatic.) It is just that during this early period, the virus sheds in far greater numbers—and infection is transmitted far more easily because of this. (Researchers have found that around 80 percent of infections are from superspreaders.) The more virus a person inhales, the greater their chance of being infected. Because the virus is very stable in tiny aerosol mists it can remain in the air a long time and infect people who are quite far away. This has particular relevance for large gatherings in enclosed spaces.

Concern has been raised about infection occurring from touching virus-contaminated surfaces. However, that doesn't appear to be a serious problem except in small enclosed rooms where those with active infections are sequestered over long periods (e.g., hospital rooms). Viral concentrations ranged from 55 percent (remote controls for televisions) to over 80 percent on ventilation grates in their rooms. No surface was found free of virus particles. The main routes of infection are still considered to be inhalation of virus-infected aerosols and droplets and from droplets or aerosols on the hands that then touch the mouth, nose, or eyes.

Once in the nose the virus looks for ACE-2 receptors. There are about 40 trillion cells in the average human body, a great many of these have ACE-2 receptors, and the nasal passages are no exception. It is here that it begins to reproduce so that it can spread through exhalations and, as well, begin to move deeper into the body. Once the virus enters the body, it has millions more options for attachment.

The "spikes" on the virus (famous from the many media representations of them) are the part of the virus that attaches to the ACE-2 receptors on the cell. To facilitate this, the spikes utilize an enzyme found on our cells—transmembrane protease, serine 2 (TMPRSS2). This enzyme "primes" the virus's spike protein so that it displays itself as a "fusion protein" to the cell via the ACE-2 receptors. This allows viral attachment to the ACE-2 receptor and subsequent entry into the cell. (The primary herb that can be used to protect TMPRSS2 integrity, and stop the priming, is *Salvia miltiorrhiza*.) A number of the more infective influenza viruses also utilize TMPRSS2 in this way. (Another intelligent intervention is interfering with spike attachment to ACE-2; see page 85.)

Generally, the virus first enters the so-called upper respiratory system (beginning with the nose). There it attaches to ACE-2 receptors on certain epithelial cells, specifically goblet secretory cells (which produce mucus) and ciliated cells (which have tiny hairlike extrusions, i.e., cilia, that move mucus and particulate matter up and out of the respiratory system). (*Bidens pilosa* is protective of these cells.) The virus utilizes those cells' TMPRSS2 to prime the spike, allowing entry inside. These particular cells possess a large number of innate immune-associated antiviral genes, which is leading to speculation that the virus may be using its access to these cells to subvert a healthy immune response. (And, indeed, interferon production does seem to be inhibited early in the infection.)

Once it gains entry into the nasal cells, the virus utilizes those cells' structures in order to reproduce, creating more copies of itself. At this point in the infection there are often no symptoms. Then, for a week, sometimes longer, the virus releases copies of itself from the infected cells. (Tests of health care workers without sufficient protective equipment found that their noses and mouths were full of live viruses that they then exhaled onto every new patient they saw.) The viruses travel outward with the breath (and also infect the hands when you rub your nose), enabling them to spread to other people, passing the infection

The main purpose of masks is to protect others if we are infected. It is not primarily to keep us from getting infected—though it does in fact help prevent it. (And yes, if you don't cover your nose with the mask, you are still infecting people.) For those with underlying lung conditions such as COPD or post-coronavirus problems (which often make mask wearing difficult because of the buildup of CO_2 behind the mask), the use of a mask with an external rechargeable air-purifying respirator, about the size of a pack of cigarettes (and which is worn on the arm), is a good idea. A tiny pump sends highly filtered outside air into the mask so that breathing is far less impaired than with a conventional mask. I now use a "4WDKING rechargeable electrical air purifying reusable portable air purifier with HEPA filter." It comes with a substantial number of replacement paper masks (which the pump/filter system connects to). The filter is good for 500 hours before replacement is necessary. The incoming air is *very* well filtered, far more than regular masks, and is cooled as it comes into the mask, which also makes breathing easier.

more widely into the species. And again, exhaled aerosols, not just droplets, can spread the virus, thus extending the range of infection to something like 15 feet, not the 6 feet that is generally suggested for safety.

The viral infection of olfactory sensory neurons (or their underlying cellular substrate), located in a small area of specialized tissue high in the nose, is the reason for the loss or dysregulation of smell that is one of the early signs of infection. The virus disrupts the cilia in the olfactory neurons; they become completely detached. Once this occurs, people lose their ability to detect odors. There is some conflict over which cells are causing the problem, infected neural cells or underlying support cells in the epithelium. (Tempers among researchers tend to run a bit high.) Olfactory neurons in the nose do connect directly to the brain and are, according to some researchers, one avenue the virus uses to infect the brain.

From the nose the organism begins to move deeper into the respiratory system, infecting goblet and ciliated cells in the throat and bronchi. This is the point where the first symptoms generally appear: slight fever, dry cough, sore throat, head and body aches. From there, the virus moves deeper into the lungs (the so-called lower respiratory system), where its preferred cell is type II pneumocytes (a.k.a. type II alveolar cells). (ACE-2 receptors are also strongly present in type I cells, but the virus seems to prefer type II; there doesn't seem to be anything in the literature on type I infection.) These cells are common throughout the lungs' alveoli (along with type I) and exist in scattered pockets in the bronchioles, and as well in the alveolar ducts.

The alveoli are incredibly tiny, microscopic, grapelike sacs at the end of very tiny, also microscopic bronchioles. Air travels through the bronchi, which diverge into smaller and smaller and still smaller air passages, at the end of which are the alveoli. The alveoli have an extremely thin exterior membrane that is covered by a network of incredibly tiny blood vessels. As we breathe in, the alveoli expand much like very tiny balloons, then oxygen (and other gases and volatiles) pass through the thin alveoli membranes into the bloodstream, and carbon dioxide (and other gases and volatiles) pass from the blood into the alveoli and are breathed out. There are around 300 million alveoli, so there are a great many ACE-2 receptors in the lungs for the virus to attach to.

As the infection progresses the immune system responds. White blood cells release activated molecules to fight the virus (cytokine is the

general name for messenger molecules, and chemokines are specialized cytokines that call immune cells to the sites of infection, but I just call them all cytokines). The alveoli fill up with fluid (edema) and dead cells, which makes breathing more difficult (pneumonia). Coughing, fever (often high), and rapid and slow respiration are common. (There are exceptions; some people never show respiratory symptoms.) Blood oxygen percentage falls. Some people experience what is called acute respiratory distress syndrome (ARDS). This is generally accompanied by what is often called a cytokine storm, a massive inflammatory response throughout the body. The oxygen levels in the blood plummet, and the alveoli are filled with pus, mucus, white blood cells, dead viruses, and destroyed lung cells. (These are the people most commonly put on ventilators. However, the majority of ventilated people, around 85 percent on average, die; there is growing recognition that ventilators may not be a proper intervention with this particular infection.) For many people, the damage to the thin cellular barrier between the alveoli and the blood vessels results in scarring, a.k.a. fibrosis. (When the alveoli are damaged, hypoxia, and eventually emphysema, or severe fibrosis can occur. Protecting the cells from this induced hypoxia can help reduce damage in the lungs. Rhodiola, *Rhodiola* spp., is specific for this. It prevents hypoxia-induced oxidative damage, increases intracellular oxygen diffusion, and increases the efficiency of oxygen utilization.)

The scarring that occurs is one cause of what is commonly called COPD (chronic obstructive pulmonary disease) or sometimes idiopathic pulmonary fibrosis. This results in long-term pulmonary problems. (Because of the scarring, the oxygen exchange is impeded so that oxygenization does not occur efficiently—thus during any event that demands the use of the muscles people run out of breath, often quite quickly. The scarring is usually progressive over time.)

It is not known how many people are developing this postinfection complication in the lungs, but it is cause for concern. There is the significant possibility that thousands of people who have apparently cleared the infection are going to experience long-term, debilitating impacts on various organs of their bodies, which will necessitate continued care the rest of their lives. (Speculation is that a decent estimate is 10 percent of the infected, whether symptomatic or not. Since current infection levels are around 30 million in the United States, that would indicate that

there are now 3 million people with post-coronavirus problems, a.k.a. long haulers. There are now internet-based long hauler support groups in many countries around the world. A rough, back-of-the-envelope computation shows current U.S. membership in such groups to already be around 200,000 members.)

One of the more important interventions during Covid-19 infection is keeping the lymph system working well in order for the immune system to work most effectively. *Salvia miltiorrhiza*—and cleavers (*Galium* spp.)—will help both the spleen and appendix (which is not a vestigial organ as reductionists have long insisted but an important part of the lymph system) work at optimum levels as well as keeping the lymph nodes clear of infection debris and thus less swollen. (Given that *Ceanothus* spp., a.k.a. red root, does stimulate clotting—although its actions are offset by other herbs in the protocols—I would avoid its use during Covid-19 infections.)

The less clogged the lymph system is, the more efficiently the body can process the cellular debris that comes from immune activity. This necessity extends to the lungs themselves as they also possess an extensive lymph system with similar nodal structures that are used to regulate interstitial fluid clearance. This is often impaired during Covid-19 infection, in part through the viral damage to lymphatic endothelial cells. (Lymph vessels are lined with endothelial cells just like blood vessels.) During pathological states where the lungs' lymph system is impaired, this loss of lymphatic function itself creates an inflammatory condition in the lungs. Protecting the integrity of the endothelial cells of the lymph vessels in the lungs and stimulating healthy lymph function is important.

In addition to *Salvia miltiorrhiza* and *Galium* spp., another herb of note (for the lungs) is *Eleutherococcus senticosus* (a.k.a. eleuthero or Siberian ginseng). It has, among its many actions, the ability to stabilize lymphatic vessels by protecting and enhancing the endothelial cells of the lymph system. The use of the herb, in clinical trials, has been shown to stimulate lymph drainage to such an extent that edema of the lower limbs was "significantly" attenuated at 2 and 4 hours after ingestion. Other herbs of note are *Scutellaria baicalensis* and *Polygonum cuspidatum*, which are both highly protective of lymphatic endothelial integrity as well as interfering with cellular invasion by pathogens

or the damaging impacts of cytokines. As specifics, both pleurisy root (*Asclepias tuberosa*) and inmortal (*Asclepias asperula*) can help stimulate lymph drainage from the lungs.

During viral infection of the lungs, the microbiome of the lungs is significantly disturbed. This can allow a bloom of what are normally quiescent pathogenic members of the microbiome. This is why during viral pneumonia most physicians will also prescribe broad-spectrum antibiotics in an attempt to ward off pathogenic bacterial overgrowth (a practice that has exacerbated the emergence of resistant bacteria in hospitals). Additionally, because coronavirus commonly infects the lower GI tract, *its* microbiome is also disturbed. Crucially, the lung and GI tract microbiomes are, in essence, a single interconnected system. Of further concern is that pathogenic or antibiotic disturbances of the GI tract microbiome also negatively affect heart function, another organ strongly impacted by the virus. (The daily use of a probiotic is strongly suggested. The cheapest good one is PB8, but those in the $40 to $60 range are better.)

At first it was believed that the virus was a typical, although unique, respiratory pathogen. It isn't. The virus can become systemic, affecting many other organs in the body. This is because ACE-2 is widely distributed throughout the body's tissues. As Hamming et al. (2004) noted in their exploration of SARS and ACE-2:

> Since identifying the possible route of infection has major implications for understanding the pathogenesis and future treatment strategies for SARS, the present study investigated the localization of ACE2 protein in various human organs (oral and nasal mucosa, nasopharynx, lung, stomach, small intestine, colon, skin, lymph nodes, thymus, bone marrow, spleen, liver, kidney, and brain). The most remarkable finding was the surface expression of ACE2 protein on lung alveolar epithelial cells and enterocytes of the small intestine. Furthermore, ACE2 was present in arterial and venous endothelial cells and arterial smooth muscle cells in all organs studied. In conclusion, ACE2 is abundantly present in humans.

Because ACE-2 is present throughout the body, the virus can, theoretically, affect any location in which those receptors exist. Again, at this point in time, the lungs, kidneys, GI tract, heart, blood vessels, skin, eyes, and liver/gallbladder are known to be the most common infection sites.

ACE-2 is ubiquitous in endothelial cells in all large and small arteries and veins in all the tissues of the body. Smooth muscle cells

have them, as do myofibroblasts (their infection is possibly the source of muscle weakness during and after infection) and the membrane of fat cells in the organs and everyplace that fat accumulates. The entire GI tract has large numbers of ACE-2 receptors: the stomach, duodenum, jejunum, ileum, and colon. (Viral infection of the GI tract is the source of the diarrhea that many people experience.) ACE-2 receptors are present in the basal cell layer of the epidermis, in hair follicles (the infection of which causes hair loss in some people), in and around the sebaceous and sweat glands, and in all the blood vessels that lie close to the skin surface. (This is the source of the skin rash that about 20 percent of those infected report.) The brain has ACE-2 receptors, as do the bile ducts, lymph nodes, heart, and kidneys. More troubling, because ACE-2 receptors are common throughout the entire circulatory system in vessel and arterial walls, blood clotting in the circulatory system has become a serious issue.

Blood Clotting

The blood coagulation problems seem to come from two main causes. As the virus spreads through the blood, it has access to a great many ACE-2 receptors on the circulatory system's endothelial cells. Viruses attach to the receptors, enter the cells, reproduce, and blow the cells apart as their offspring exit. In essence, this is no different than a scrape to the surface of the skin. It's a wound. So, the internal version of a scab begins to form. Unfortunately, this is happening not to one cell but to thousands.

Damage to the endothelial cells that line the vessels recruits platelets to that location, where they begin to cluster at the point of damage. The platelets initiate the production of fibrin, which forms a kind of net that traps within it more platelets and red blood cells, essentially plugging the wound (i.e., creating a clot, a.k.a. the internal form of a scab) in the vessel wall. This is the initial, primary cause of the massive clotting in the body—though as mentioned earlier certain inflammatory processes stimulate systemic clotting as well. Because so many cells are affected, there are hundreds to thousands of clots forming throughout the entire circulatory system and, potentially, in every organ of the body.

Given that coagulation (clotting) problems are so extremely common with this infection—as well as the fact that many people with asymptomatic Covid-19 appear well but suddenly experience stroke or heart

attack—the use of anticoagulants is, I think, essential. A number of the herbs suggested for use in treating Covid-19 infections are anticoagulant and very specific for protecting endothelial cells from inflammatory damage and/or stopping clotting—*Salvia miltiorrhiza, Polygonum cuspidatum,* and *Scutellaria baicalensis* are some examples. However, I think the daily use of specific anticlotting agents is warranted for anyone—whether infected or not—for the duration of the pandemic. I suggest either lumbrokinase or nattokinase—and yes, serrapeptase will work, too, but it is very weak compared to the other two. (Lumbrokinase is 30 times stronger than nattokinase and 300 times stronger than serrapep-tase; I would suggest that only lumbrokinase be used given the excessive clotting the virus causes. The worm-derived form is strongest.)

Note: Those already on anticlotting drugs, a.k.a. "blood thinners," should avoid the use of lumbrokinase or, at minimum, approach its use with caution.

Immune Dysregulation

Nasal goblet cells, some of the first cells infected, are involved in initial interferon (IFN) responses to viral infections. But with this virus, there is considerable evidence that IFN responses are dysregulated. During early infection, as soon as the nasal goblet cells are infected, IFN responses are delayed. Later, IFN activity is often overactive, initiating highly inflammatory cytokine cascades. In the latter situation, there is strong evidence that what is called cyclic GMP-AMP synthase (cGAS) and its downstream effector STING (stimulator of interferon genes) become overactive. This same dynamic is the source of an unrelated but difficult and painful autoimmune disease called STING-associated vasculopathy with onset in infancy (SAVI). Unsurprisingly, the symptoms it causes bear a resemblance to some of the symptoms that occur during Covid-19 infections.

STING is an adaptor molecule that links sensing of foreign microbial pathogen DNA to the production of type 1 IFNs during the innate immune response. It is expressed in alveolar macrophages, bronchial epithelium, and type II pneumocytes—all SARS-CoV-2 infection sites. STING has a direct effect on endothelial cells, stimulating inflammation and initiating a coagulation cascade. This is in addition to the dynamics already in play through viral attachment to endothelial ACE-2 receptors.

STING dysregulation, caused by the SARS-CoV-2 virus, is at the root of many of the pulmonary, coagulation, and inflammation problems seen both in Covid-19 infections and SAVI. (Note: This may be related to the condition, termed multisystem inflammatory syndrome in children, or MIC, that is affecting increasing numbers of children, teenagers,

Tiny Rant: A number of people have expressed concern about upregulating and strengthening ACE-2 since the virus attaches to that receptor. Wouldn't it be better, they say, to just inhibit ACE-2 in the body completely? Why don't we just get rid of ACE-2 entirely? Then we won't get infected. Won't upregulating and strengthening ACE-2 lead to more attachment points and more infection? Well, no, it's not that simple. For one thing, there are some 40 trillion cells in the human body, a significant number of which have ACE-2 receptors on them—including fat cells. The more fat you have, the more ACE-2. (Needless to say, Americans have a *lot* of ACE-2 receptors.) Getting rid of ACE-2 receptors is simply not possible, which is a good thing since they are essential for the body to remain healthy. Without them we die. Really really fast.

Secondly and importantly, *herbs are not drugs*. Nor are they even *raw drugs*, which some phyto-semi-rationalists and reductionists erroneously call them. They are plants, which are, at root, only one thing: ecological modulators—of both large systems like the Earth and smaller ones like our bodies. They act to move systems, irrespective of size, back to health, to reestablish homeodynamis—what some people incorrectly call homeostasis (there are no static states in nature, only dynamic ones). And plants are extremely good at their job, which they have refined over several hundred million years or so.

Pharmaceuticals, which are a century old or so, are single molecules that force a change in the body of one sort or another. (They come out of a medical system whose approach to disease is based on cut, kill, or force—and now perhaps, to some extent, and very dangerously, reprogram.) They don't usually perform multiple actions. Herbs often contain hundreds of compounds that act synergistically. *Pueraria lobata* (kudzu) does not simply upregulate ACE-2. It is more accurate to think of its actions with ACE-2 as performing a modulatory and regulatory function as part of a much wider range of actions in the body (such as downregulating overactive cytokines like TNF-α and IL-1β and supporting the health and maturation of dendritic cells). It is *not* a single-action stimulant (such as a pharmaceutical) that forces ACE-2 expression, nor is it a straight suppressant, depressing ACE. You *can* compare apples and telephone poles, it just doesn't make any sense when you do.

and young adults, which was first noted in New York. They get a mild case of Covid-19, then several weeks later develop a serious multiorgan inflammation requiring hospitalization. Most recover; some do not.)

SAVI is accompanied by abnormal inflammation throughout the body, especially in the skin, blood vessels, and lungs—idiopathic pulmonary disease is a common problem for children with SAVI. There are also continual problems with blood vessels (vasculopathy) and damage to the tissues that rely on these vessels for their blood supply. The condition causes a chronic vessel-endothelium inflammation that leads to the vasculitic rash common in SAVI . . . but also seen in Covid-19 infections. This often extends to the toes and fingers, producing a condition that is very similar to what is being called "Covid toe." As with Covid toe, the rash is not limited to the toes but extends to the sole, sides, and top of the foot and is sometimes accompanied by lesions. JNK (c-Jun N-terminal kinase) inhibitors have been found to help quiet the STING-initiated, overactive IFN activity, reducing the systemic inflammation in the body. (Some plants that inhibit JNK are *Ailanthus altissima*, *Andrographis paniculata*, *Aster tataricus*, *Eucommia ulmoides*, *Forsythia suspensa*, *Glycyrrhiza* spp., *Lonicera japonica*, *Magnolia officinalis*, *Paeonia suffruticosa*, *Polygonum cuspidatum*, *Sophora flavescens*—all of which have been found to be useful for treating pulmonary problems similar to those caused by this coronavirus.)

As with Lyme infections, interfering with the production of upstream cytokines during Covid-19 infections can significantly reduce the inflammatory cascades they initiate, thus reducing the damage to the body. Xiaobing Deng, Xiaoyu Yu, and Jianfeng Pai (2020) comment that control of upstream cytokines is a promising strategy in the treatment of Covid-19, with special attention paid to the dysregulation of type 1 IFN that the virus causes early during infection. Stopping the virus-caused abnormal activity of cGAS-STING, which is a main source of cytokine overactivation and inflammation, is one potential upstream point at which to intervene. The plant-derived cyclopeptide astin C is particularly potent in accomplishing this. It's a compound from the plant *Aster tataricus* (a highly underutilized herb in the Western world), which has been used in traditional Chinese medicine for some two thousand years. The root is often used to treat lung and bronchial disease, especially chronic bronchitis and coughing. It is considered antibacterial and antifungal (with a good range of action against a

number of pulmonary pathogens), antitussive (reducing coughs), expectorant (expressing mucus out of the system), and stimulant. It is particularly good for a number of post-coronavirus problems. (This is not an herb that I have previously used or have experience with—though that is changing—but given its history of use and its ability to inhibit JNK and cGAS-STING its use with Covid-19 certainly should be considered.)

As noted, there are ACE-2 receptors on macrophages, monocytes, and lymphocytes, including T cells. This allows the virus entry into those cells, where it can then affect immune responses. There is growing evidence that, like SARS-CoV-1, this virus can also infect dendritic cells and it definitely does interfere with their maturation. By infecting a wide range of immune cells, the virus can lower or inactivate some immune responses and significantly upregulate others. Similarly to the *Borrelia* bacteria that cause Lyme disease, it is very sophisticated in modulating immune responses to infection. During early stages, it shuts down significant parts of a healthy immune response, which allows the virus to spread and infect widely divergent parts of the body more easily. (As an example, during SARS-CoV-2 infection it is common for the body to have very low levels of lymphocytes, a condition called lymphocytopenia. *Houttuynia cordata* is very good at correcting this as well as being a specific antiviral for this particular virus.) Later in the infection, the virus stimulates immune activity, thus causing more inflammation. (Inhibitors for the organism's actions on the immune system is covered a bit later on.) Some people have immune responses that do in fact quite easily stop the infection, while others, apparently very healthy, do not. No one knows why. (Reductionists continually fall back on GENETICS!, which they use about the same way that our ancestors used "the gods did it" or "it's an imbalance in the humors." The truth is they don't know.)

CD147 and Cyclophilin A

The virus has also been found to attach itself to the CD147 receptor that is present on many cells in the body. CD147 is also known as neurothelin, basigin, or, more descriptively, extracellular matrix metalloproteinase inducer (EMMPRIN) since it stimulates fibroblasts to secrete a range of matrix metalloproteinases (MMPs)—themselves a source of inflammation and cellular breakdown. (The plethora of names that all refer to

the same thing that researchers continually come up with are a constant source of irritation to those of us who use language to communicate.)

CD147 is regarded as a novel modulator of inflammatory and immune disorders and its dysregulation has been linked to the pathogenesis of such things as asthma, lung inflammation, hepatitis, myocardial infarction, ischemic stroke, and, importantly, neuroinflammatory diseases—most of which occur during Covid-19 infections.

CD147 receptors are found on olfactory and brain neurons, red blood cells, epithelial cells, endothelial cells, leukocytes, monocytes, lymphocytes, neutrophils, and platelets. It is strongly upregulated on activated immune cells, neutrophils, T and B lymphocytes, monocytes, macrophages, and dendritic cells. While the virus can use this receptor to gain entry to cells (and does sometimes do so), it appears that a more important aspect is the affinity of cyclophilin A (CyPA) for CD147 receptors.

Damaged epithelial and endothelial cells and macrophages tend to upregulate and release CyPA, and CyPA has been found to stimulate CD147 surface expression on cells. CyPA has been shown to facilitate viral replication, including that of SARS-CoV-1. CyPA, when released from cells, strongly binds to the upregulated CD147 receptors. By attaching itself to the CD147 expressed on the surface of cells and simply waiting, the virus gains access to the CyPA, which, when released from damaged endothelial and epithelial cells, seeks out CD147 to bind with. When it does so, the virus can utilize the CyPA to facilitate its reproduction. Viral load then increases substantially.

The cyclophilin inhibitor cyclosporin A has been found to inhibit the replication of coronaviruses. (*Magnolia officinalis* contains magnoloside A, which has also been found to inhibit CyPA. It is a traditional Chinese herb used to treat, among other things, lung infections and inflammation.) As well, anti-CD147 antibodies tend to inhibit the virus from attaching to host cells or using that receptor to gain entry into them. (*Scutellaria baicalensis* accomplishes this as well, in part, by downregulating CD147 expression.) Blocking CD147/CyPA interactions during in vivo studies of induced acute lung inflammation by the use of anti-CD147 mAb led to a 50 percent reduction of neutrophils within the lung tissues and airways accompanied by a similar decrease in tissue damage (Zhu et al., 2014).

CyPA is a potent proinflammatory molecule. The more that is released from damaged cells, the more inflammation that occurs in the system. The binding of CyPA to CD147 activates MAPK pathways, stimulates leukocyte recruitment, and specifically induces MMP-9 expression through ERK and NF-κB pathways, all of which play a role during Covid-19 infections. (Among other actions, *Polygonum cuspidatum* strongly downregulates MMP-9.) CyPA also induces the production of numerous cytokines, e.g., IL-1β, IL-6, and IL-8, in macrophages and monocytes and promotes the proliferation and migration of VSMC (vascular smooth muscle cells). It enhances platelet adhesion and thrombus (clot) formation and activates ERK-1 and ERK-2, NFκB, Akt, JNK, and p38 MAPK, again, all of which play a role in Covid-19 infections.

Inflammatory Cytokines

Once the virus enters the body it initiates a rapid process of replication that causes massive endothelial and epithelial death (apoptosis) and, because of the endothelial cell damage, vascular leakage. This triggers the release of "exhuberant" (as they say) proinflammatory cytokines and chemokines (known hereafter as just plain old cytokines). These include TNF-α, IL-1β, IL-6, IL-8, VEGF (vascular endothelial growth factor), MCP-1, among others. The viral infection of macrophages and lymphocytes can result as well in a type of apoptosis or cell death called pyroptosis that is by its nature highly inflammatory when it occurs. The virus doesn't generally reproduce in white blood cells but it does actively interfere with their ability to fight off the infection. (See the section on smoking, page 90, for a bit more on this.)

In addition to attaching to and infecting ACE-2 receptors, the virus can also downregulate ACE-2 and induce, as they say, the shedding of "catalytically active ACE-2 ectodomain"—these guys are great fun at parties. What this does is initiate the loss of ACE-2 function in the lungs, which tends to create acute lung injury. This loss of ACE-2 function often causes dysfunction of the renin-angiotensin system (RAS) in the body. RAS is intimately involved in modulating a number of systems in the body needed for health. As soon as ACE-2 reduction or loss occurs, general inflammation in the body increases and vascular walls become more permeable. In the lungs, loss of ACE-2 results

in more edema, leaking blood vessels, neutrophil accumulation, and diminished lung function.

Protecting and strengthening ACE-2 receptors is, I think, essential. Herbs that block viral attachment to ACE-2 linkages are *Glycyrrhiza* spp., *Scutellaria baicalensis*, *Sambucus* spp., *Aesculus hippocastanum*, *Polygonum cuspidatum*, *Rheum officinale*, and plants high in procyanidins and lectins (e.g., *Cinnamomum* spp., i.e., cinnamon). Herbs that upregulate ACE-2 are *Pueraria lobata*, *Salvia miltiorrhiza*, and *Ginkgo biloba*. ACE inhibitors (in contrast to ACE-2 upregulators) will increase the presence of ACE-2 and help protect the lungs from injury: *Crataegus* spp. and *Pueraria lobata* are specific for this. (This is part of the reason *Crataegus*, i.e., hawthorn, is good for heart health; it upregulates ACE-2 by downregulating ACE, thus increasing ACE-2 receptors in the heart, thus supporting heart health and vitality.)

To continue . . . the increase of TNF-α and IL-1β in the system stimulates the "shedding" of ACE-2, which results in less membrane-bound ACE-2 on the body's cells. This is pervasive throughout the body—the more inflammation, the more shedding. No matter the organ, when this shedding occurs, organ function decreases. (Plants that can inhibit TNF-α include *Andrographis paniculata*, *Cordyceps* spp., *Eupatorium perfoliatum*, *Glycyrrhiza* spp., *Houttuynia cordata*, *Pueraria lobata*, *Salvia miltiorrhiza*, *Sambucus* spp., *Scutellaria baicalensis*, and melatonin, not a plant but useful in this infection for a variety of reasons. IL-1β inhibitors include *Cordyceps* spp., *Eupatorium perfoliatum*, *Polygonum cuspidatum*, *Pueraria lobata*, *Salvia miltiorrhiza*, *Scutellaria baicalensis*.)

SARS-CoV-2 can, it seems, infect dendritic cells (DCs), both mature and immature. It doesn't kill them (as far as I can find) but merely stops them from maturing and thus initiating an effective adaptive immune response. DCs exist abundantly just under the epithelium layers in the lung tissue. The cytokine upregulation that infection causes makes the endothelium much more porous, allowing the virus to penetrate and infect the DCs. Upregulated IL-6 and IL-8 from epithelial and endothelial cells concentrate around the immature DCs and strongly inhibit their maturation and the priming ability that mature DCs have for the generation of active T cells. This inhibits the production of active T cells, allowing the spread of the infection. Stimulating DC maturation (*Cordyceps* spp., *Pueraria lobata*), along with inhibiting cytokines, can help prevent this.

Dysregulation of the brain ACE-2 and RAS system is intimately related to poorer cardiac function as well as dysregulated hypothalamic function, blood pressure, and autonomic system function. (This is a contributing element to the wide range of neurological effects that are being seen.)

Not to get into it too deeply, ACE-2 (angiotensin converting enzyme 2) antagonizes the actions of angiotensin II (AngII). AngII is involved in modulating immune function. When not controlled by the presence and action of ACE-2, it contributes to general and autoimmune inflammation, hypertension, organ and ventricular hypertrophy, and the decrease of endothelial progenitor cells that are necessary for vascular repair and promotes organ damage and fibrosis in the body. The less ACE-2, the more those effects occur. ACE-2 is *very* important to healthy functioning. ACE-2 is powerfully affected by the virus, so, again, the use of ACE-2 protectants and modulators that normalize function is, I think, crucial.

The extensive cytokine release in the body causes an ongoing inflammation that can attack most organs, eventually leading to organ damage and collapse. Interfering with the generation of the cytokines, which can be accomplished through a variety of herbal interventions, can substantially help the course of infection. For example, some researchers have found that simply reducing IL-6 during a Covid-19 infection will reduce inflammation, making the disease less acute, and enabling a better long-term resolution. That is why the arthritis drug tocilizumab, which inhibits IL-6, has been found of use in treating acute Covid-19 infections.

IL-6 and IL-8 are two of the more important cytokines to inhibit as part of Covid-19 treatment. IL-6 plant inhibitors include *Andrographis paniculata, Isatis* spp., *Pueraria lobata, Salvia miltiorrhiza, Scutellaria baicalensis,* and melatonin (which is often a constituent in many medicinal plants). IL-8 inhibitors include *Cordyceps* spp., *Isatis* spp., *Polygonum cuspidatum.* (And just to note: Melatonin has good application in this disease, not only as an anti-inflammatory but also because, among other things, it helps reduce anxiety and promotes sleep.)

A Further Comment on RAS Dysregulation

When the virus disrupts the RAS system, it also dysregulates the mechanisms for regulating a chemical called bradykinin. Bradykinin levels increase in the body, causing a "bradykinin storm." A number of researchers now feel that some of the more serious effects of a Covid-19 infection come from this. In concert with a cytokine storm, the results can be deadly.

As bradykinin builds up in the body, vascular permeability substantially increases. In other words, the blood vessels become leaky. This causes more fluid to build up in the lungs. In addition, the virus appears to increase production of hyaluronic acid (HLA), which, when combined with the fluid leaking into the lungs, creates a kind of hydrogel. As researcher Daniel Jacobson notes, "It's like trying to breathe through Jell-O" (Thomas Smith, 2020). Because the alveoli are filled with this gel, even ventilators are unable to get more oxygen into the blood.

This increase in bradykinin also affects the heart, causing alterations in blood pressure and heart rate. Brain inflammation increases, producing neurological symptoms. Blood potassium levels increase, cough and fatigue occur, smell and taste are altered or suppressed.

Polygala tenuifolia inhibits bradykinin-mediated effects on the body and reduces levels of bradykinin in the body. It is specific for bradykinin-mediated pain and inflammation. *Sophora japonica* can help protect the brain from bradykinin-mediated inflammation and vascular effects.

Note: During Covid-19 pulmonary infection the use of any *Echinacea* species should be avoided, as continuing, large doses of it will increase HLA levels in the body.

The Heart

As mentioned earlier, the virus does infect cardiac cells via their ACE-2 receptors and thus damages heart tissues, including its muscle tissue. Some people so affected have no respiratory symptoms at all and present at the hospital solely with cardiac problems such as sudden heart attack. At first glance it seemed that perhaps 10 percent of those infected with Covid-19 suffered cardiac complications. This is now uncertain; it may be far greater. Permanent heart damage is apparently occurring in more people than was at first realized. Many asymptomatic people or those

with very few symptoms are finding that even though they are apparently well they now have underlying myocarditis (inflammation of the heart).

Two studies in Germany raise serious issues for long-term heart problems in those who have recovered from Covid-19. In one, MRIs of 100 people who had recovered from the infection were compared with 100 similar people who had not been infected. Seventy-eight of the infected were found to have signs of structural damage to the heart, 60 of them had myocarditis. All of them were relatively young. (A second study on 39 people who had died from the infection found that 24 of them had active virus in their heart tissue.) In essence, many people who recover from the disease are going to have long-term heart problems from the infection. The heart damage can become serious when the body is put under muscular stress. Several athletes have died after returning to their sport simply due to pressure on the heart from extreme exertion. Examinations of others who seemed well have found chronic heart inflammation where there previously was none.

During cardiac infection the initial manifestation is "an increase in high-sensitivity cardiac troponin 1 (hs-cTnl) levels" (Y.-Y. Zheng et al., 2020). As the damage spreads, median creatine kinase levels rise to double the levels of those without cardiac infection. In a more perfect world everyone infected with this virus would be tested for those elevated cardiac biomarkers. (They aren't.)

Herbal interventions are very specific for preventing this kind of damage during infection. In general, during the pandemic it is a good idea to take heart adaptogen and tonic hawthorn (*Crataegus* spp.) as part of a daily preventive regimen. The herb most specific for the damage the virus causes is *Salvia miltiorrhiza*. It is significantly more effective if combined in a one-to-one ratio with *Pueraria lobata* (L. Wu et al., 2007). A combination of *Paeonia suffruticosa* and *Salvia miltiorrhiza* has also been found to be effective (H. Li et al., 2016). *Salvia miltiorrhiza* is a truly important medicinal in the treatment of inflammatory diseases such as Covid-19. It has a long history of use in China for the treatment of systemic disease, including reversing or treating adverse impacts in most organs of the body including the heart. It is effective for inhibiting increases in troponin and creatine kinase—again, not as a suppressor but as a modulator of function. The herb promotes blood circulation, inhibits platelet aggregation, protects endothelial structures, is anticoagulant, antihypertensive, antithrombotic, antiallergenic, and

strongly protective of the kidneys. It is a potent cytokine adaptogen—reducing any cytokine levels that are too high, increasing any levels that are too low—another way to think of it is as an immune-response adaptogen. It is strongly anti-inflammatory, protects Golgi structures, is neuroprotective, restores mucosal integrity in mucosa-infected cells, is highly protective of the spleen—enhancing its immune functions—and has shown remarkable effectiveness in the treatment of lung disease. In short, a truly world-class systemic modulator for inflammatory diseases of any sort.

The world's best herbal monograph (on *any* herb) is the three-volume (1,800 pages total) compilation by Xijun Yan (editor): *Dan Shen (Salvia miltiorrhiza) in Medicine* (2015). It covers every possible use of the herb and looks at both historical use and its outcomes in clinical trials and in laboratory study. It makes any other herbal monograph in existence look paltry and rather shamefaced in comparison.

Scutellarin and baicalin from *Scutellaria baicalensis* are also particularly effective in treating and preventing heart damage from the virus. Scutellarin prevents the increase of cardiac troponin (by correcting or preventing the underlying damage). Baicalin inactivates creatine kinase. Specifically the herb has a broad range of cardiovascular actions: It promotes vasodilation, protects against ischemia/reperfusion, is anti-inflammatory, anticoagulatory, antithrombosic, protects endothelial integrity, protects the myocardia, stops cardiac remodeling, and possesses anti-arrhythmic actions. It is also a strong systemic antiviral herb, specifically so for this particular organism. It has a long use in China for treatment of blood circulatory problems and cerebral insufficiency. (Quercetin and *Polygonum cuspidatum* will also inactivate creatine kinase.)

Additionally, a Chinese blend called QiHong (not findable as a premade formulation on the internet as far as I can determine) is very specific for preventing viral myocarditis. It is a blend of equal parts of *Astragalus* spp., *Rhodiola rosea, Sophora flavescens.*

One final thing: L-malic acid has been found to be extremely low in the infected; levels become progressively lower as severity increases. L-malic acid is an essential amino acid in the body when the immune system is struggling with any type of systemic inflammation. This amino acid is rapidly consumed during inflammatory states in order to provide energy and materials for the proliferation of and phagocytosis capacities of immune cells. Supplementing L-malic acid is strongly

suggested, especially during more serious infections. (It can cause diarrhea in high doses.)

Given that long-term heart damage is likely, an MRI of the heart is indicated for anyone who has been infected and subsequently recovered. Use of heart-supportive herbs is highly suggested.

A Brief Comment on Smoking and Covid-19

Despite a great many media articles early in the pandemic that insisted that smokers who contracted the new coronavirus would suffer worse outcomes than nonsmokers, such has not generally been the case. (Initiate hair pulling by prohibitionists.) As Lippi and Henry (2020) comment: "In conclusion, the results of this preliminary metaanalysis based on Chinese patients suggest that active smoking does not apparently seem to be significantly associated with enhanced risk of progressing towards severe disease in COVID-19." Some researchers are speculating that since smoking reduces macrophage activity it interferes with the systemic inflammatory processes the virus initiates. As Yang and Chen (2018) note:

> A study by Chen et al demonstrated that in smokers' alveolar macrophages, there is a decrease of proinflammatory cytokines including TNF-α, IL-1β, IL-6, IL-8, and reduced TLR2 and TLR4 signaling as a result of impaired activation of NF-κB.

These are in fact some of the most active of the cytokines during Covid-19 infection, which explains why smokers generally have a better outcome *in acute infections* than nonsmokers.

Other researchers speculate that because nicotine has definite effects on the RAS/ACE system (modulating its actions), *that* is the reason for smokers' better outcomes during infection. As well, nicotine actually prevents acute lung injury in animal ARDS models and has immune modulating actions. (To stop the run on nicotine patches the French government prohibited the sale of over-the-counter patches until the pandemic subsides. Nevertheless at least one hospital in the EU issued nicotine patches to all its medical workers . . . always fun to see a prejudice defeated by a deeper prejudice or, in this case, a deeper fear.)

There is, inevitably so, continued conflict on this issue between researchers who have a strong prohibitionist orientation and those who are just looking at the data. Only time will reveal whether smoking

reduces negative outcomes during acute infection but at this point in time, it appears that it does due to its lowering the activity of certain cytokines by inhibiting macrophage activity.

Post-Coronavirus Syndrome

There is a growing recognition that many people who have been infected by the virus continue to report severe symptoms for months (and perhaps much longer) after their initial infection. These are now being referred to (most commonly) as "long haulers," that is, people who "should" have recovered but have not. And most of them are relatively young—three in five are between the ages of 30 and 49. (Some continue to test positive for the virus, others do not—false negatives are common in around 30 percent of those tested; there is, as yet, no truly reliable test.) Somewhere between one in 20 and one in 10 people are reporting a long-term illness. (Newer research is revealing that as many as 30 percent of the asymptomatic may develop long-haul symptoms.) Some have been experiencing debilitating symptoms for as long as 12 months; no one yet knows how long it will be until they resolve . . . if they ever will.

As Jorge Mercado, MD, comments, "Reports on potential for long-term consequences have been broad, from blood clots to heart damage, lung damage, and neurological symptoms. While some conditions may be reversible over time, there is growing evidence that some long term effects from COVID-19 may be irreversible" (Seaton, August 7, 2020).

Margot Gage, an epidemiologist, was infected early in the pandemic, as was her family. Unlike them, she became seriously ill. Five months later, she still has brain fog, seizures, and extreme fatigue. She still can't work. Luckily she found a responsive and knowledgeable physician . . . most have not been so lucky (Seaton, August 5, 2020).

As with Lyme disease, many physicians believed (as some continue to do) that long-haul coronavirus problems do not exist. In other words, that there is no post-coronavirus syndrome. This is, of course, infuriating to those who suffer from it. As Fiona Lowenstein (2020) comments:

> Since contracting Covid-19 in March [2020] and launching a virtual support group for other patients, I have witnessed first hand the limitations of expert advice for a novel pandemic, and the need for patients to become their own experts and advocates. When my own Covid-19 case morphed and dragged on for months, I found no expert advice that applied to my situation. . . . Connecting

to thousands of other patients helped me discover that my symptoms and "long-haul" condition were not unusual.

It wasn't until July 24, 2020, that the CDC finally issued a statement acknowledging that up to a third of those infected with the virus were suffering long-term problems. Prior to this physicians routinely discounted their patients' experiences. (Again, this is an incredibly common experience for many people who enter the medical system, irrespective of the condition they have.)

Carol Holguin, for example, was still experiencing Covid-19 symptoms 130 days after initial infection. Medical providers continually dismissed her when she told them of her condition—even in the early stages of infection.

"'I'm having trouble breathing,' I told the nurse. She inquired about my other symptoms, which included vertigo and light-headedness. But I'd never had a fever above 100.4, so she said I couldn't be tested. Then she told me it sounded like I had anxiety." (Regrettably, it is extremely common for licensed medical technologists with no depth training in psychology to diagnose psychopathology instead of listening to their patients.) As Holguin notes, being refused treatment was a "turning point because I took my health into my own hands." Still, her symptoms continued, often worsening.

Suddenly, months later, she couldn't breathe. Her husband called the EMTs. She told them she was positive for Covid-19 and was sure it was the virus acting up again "but they didn't listen." Later, she comments, "I asked the cardiologist if this could be Covid-19, but he didn't even acknowledge the question" (Holguin, 2020).

As Ed Yong reports in *Atlantic* magazine (June 4, 2020), another patient, Hanna Davis, told of similar dismissive behavior. Yong relates, "Davis described her memory loss and brain fog to a neurologist, who told her she had ADHD. 'You feel really scared: These are people you're trying to get serious help from, and they don't even understand your reality,' she said. Vazquez [another of the infected] said her physicians repeatedly told her she was just having panic attacks. . . . Athena Akrami, a neuroscience professor at University College London, said two doctors suggested she was stressed, while a fellow neuroscientist told her to calm down and take antidepressants." As Yong comments, "Well before the pandemic, the health care profession had a long history of medical

gaslighting—downplaying a patient's physical suffering as being all in their head, or caused by stress or anxiety."

When these kinds of long-term problems occur—which generally points to an ongoing chronic condition—medical practitioners often separate into different cliques, each promoting or defending their favorite explanation or theory. (Extensive name-calling is common.) But those who continue to struggle with debilitating symptoms are the ones who suffer for it. As Clare Rayner, a consultant in occupational medicine in the UK, says, "There's pathology here that's not being investigated." Or as Timothy Nicholson, MD, puts it, "Lots of people feel that their symptoms are not believed" (Gross, 2020). (This is because they are not.) Note: One of the better articles on long haulers (as I was finishing this update) is "What If You Never Get Better from Covid-19?" (Velasquez-Manoff, 2021).

As I mentioned, these kinds of responses have been common in the Lyme community with which I've worked for over 15 years now. Many people in this community have long-term post–Lyme disease symptoms, which are still routinely discounted. (The most common response from physicians is some form of "it is all in your head" and the prescribing of some form of psychotropic drug, usually an antianxiety medication.) Because so few physicians understand or are responsive to their struggles, both the Lyme and Covid-19 community have formed support groups (easily found via the internet and on Facebook). This kind of support can make the journey to health far easier than it would be otherwise. Both groups are focused on taking back control of their health care, the journey to health, and are exploring a great many interventions to reduce or eliminate the symptoms they experience. None of them are willing to accept that there is nothing that can be done.

The most common symptoms that accompany post-coronavirus syndrome are severe fatigue, headaches, trouble breathing, and a recurrent cough. But there are a great many more than that . . . over 80 symptoms have now been reported. Things are quite a bit more complicated than they appeared to be when the virus was first being treated. There are not just the dead, the sick, and the recovered. There are the (potentially) hundreds of thousands, or millions, who are still struggling, some of whom may take years to recover, some of whom may never do so.

Post-Coronavirus Syndrome: The Symptoms

Many of the people with long-term problems have tested negatively for antibodies. (Again, no one knows why . . . maybe they can't make them or maybe the antibodies fade quickly.) One of the main fears for many of them is reinfection, which could make things much worse when added to the problems they still have. (The Covid-19 protocol outlined on page 105 can help prevent, or significantly reduce the intensity of, reinfection.)

The long-term symptoms people experience are often cyclical in nature—they come and go, much like relapsing fever infections such as malaria. (With malaria, the infection recurs as new generations of malarial parasites are born, generally on a very specific schedule.) The recurrence can be mild or strong. And to make things worse, the recurrent symptom may not be the same each time. For some people, the body seems to cycle through a number of symptoms over and over again.

Fatigue is very common. For many it is severe and debilitating, so much so that a month in bed every so often is not uncommon. This is being likened to chronic fatigue syndrome (also known as myalgic encephalomyelitis or ME) though (of course) arguments are occurring over what *real* ME is and is not. (No, no, it is the tiny mark on the corner of the stamp that makes it a true 1942 Eagle, not the smudged ink at the top.) It reminds me of the Greek scholar who spent 40 years proving that *The Odyssey* wasn't written by Homer but by another Greek of the same name. No matter the medical arguments, what people are experiencing is an unremitting fatigue that is indeed chronic. They just want it to go away.

(Supporting mitochondrial health is essential in chronic fatigue-like conditions as they are the source of energy in all our cells. Also important is the use of adaptogenic herbs, which will increase energy and help the body respond to long-term chronic conditions and the stress they bring.)

Shortness of breath is another very common problem. It can be periodic or continual and ranges from feeling slightly out of breath to the breathlessness you feel after you have run a race. But it can also present as intense episodes of "air hunger" where the body just can't seem to get enough oxygen. It feels as if every cell in the body is starving for air simultaneously and is, not surprisingly, accompanied by extreme anxiety and panic.

SYMPTOMS THAT MAY OCCUR DURING INFECTION AND ARE ALSO COMMON FOR THOSE SUFFERING POST-CORONAVIRUS SYNDROME

SYSTEM	SYMPTOMS
Respiratory system—upper	Loss or alteration of smell, nasal congestion, sneezing, sore throat (severe or mild), sinus pain (severe or mild), postnasal drip, sinus infections
Respiratory system—lower	Persistent uncontrollable cough, dry cough, cough with mucus, extreme mucus production by lungs, coughing up blood (hemoptysis), shortness of breath (severe and mild), air hunger, hypoxia, wheezing, rattling breath (a.k.a. crackling or Velcro sounds), lung burn (severe or mild), pneumonitis, pneumonia, cessation of breathing during sleep, tightness in chest (severe or mild), chest pain, fibrosis, emphysema, chronic obstructive pulmonary disease (COPD), idiopathic pulmonary fibrosis, bronchiectasis, recurrent lung infections
Temperature regulation	Repeated shaking with chills, continual or recurring high or low fever, hot flashes, chills, sweats
Ears	Earaches, tinnitus (severe and mild), otitis media, hearing loss, eustachian tube dysfunction
Eyes	Sensitivity to light, eyestrain, blurry vision, floaters, pink (red) eye
Oral/mouth	Loss of taste, rash, tooth loss, tooth fragility/chipping, teeth turning gray, more cavities, sensitive gums, salivary gland ectasia, temporomandibular joint abnormalities, facial pain, masticatory muscle weakness
Liver	Elevated liver enzymes, fibrosis, cholangiopathy (bile duct damage), hepatitis
Reproductive system	Low libido, damage to reproductive system (male and female): menstrual irregularity, severe cramping, infertility, erection problems, bilateral orchiditis, testicle pain, hypogonadism, extended menstrual bleeding, cessation of menstruation, early menopause
Musculoskeletal	Fatigue (severe and mild), muscle pain (myalgia, severe or mild), joint pain (arthralgia, severe or mild), body aches (severe or mild), muscle spasms, body shaking, hand tremors, feeling of electricity zapping through body, tingling/numbness in extremeties, extreme muscle weakness

(Chart continues on the next page)

(Continued from previous page)

SYSTEM	SYMPTOMS
Kidney/urinary	Frequent urination, proteinuria, hematuria, elevated serum creatine, elevated urea nitrogen, extreme thirst, kidney injury (acute or mild), fibrosis
Skin	Dry skin, rash, prominent veins, easy bruising, acne flare-ups, extreme skin sensitivity (to touch of any sort), tingling, red/purple lumps (itching or not)
Heart and blood	Myocarditis (inflammation of heart muscle), blood clotting (often extensive), cardiomyopathy, generalized inflammation throughout system, fibrosis, palpitations, heart attack, low pulse rate, fast pulse rate, elevated heart rate (tachycardia), postural orthostatic tachycardia syndrome (POTS, dizziness or fainting upon standing suddenly)
Gastrointestinal tract	Diarrhea (mild or severe), cramping (mild or severe), loss of appetite, nausea, vomiting, lower esophagus burning
Neurological	Brain fog, trouble concentrating, short-term memory loss, anxiety (severe and mild), panic attacks, depression (severe or mild), headache (severe or mild), malaise, vertigo, dizziness, lucid dreaming, mood swings, seizures, stuttering, various psychiatric disorders, muscle weakness, nerve pain, depressed levels of consciousness, tingling/fizzing sensations throughout body, hair and scalp pain, confusion, a sense of not being one's self, long-term mental impairment, anxiety, insomnia, paralysis, severe psychosis, delirium, hiccups, stroke, encephalopathy (general), parainfectious or septic encephalopathy with psychosis or delirium, meningoencephalitis, limbic encephalitis (in the thalami, medial temporal regions, and pons), microbleeds, acute hemorrhagic leukoencephalitis, postinfectious brain stem and cortical autoimmune encephalitis, parainfectious involvement of central and peripheral nervous system, brachial plexopathy, acute myelitis, quadriparesis, facial paresis, Guillain-Barré syndrome
Miscellaneous	Hair loss, swollen lymph nodes, insomnia (severe or mild), low immune function, Sjögren's syndrome, syncope, compulsive water drinking

You can find the rest of the extended symptom list in the chart that begins on page 95. This is taken from a May 2020 analysis of a survey by the group Patient Led Research for COVID-19, which you can find online (see also Assaf, 2020), and from a number of other sources such as news articles, journal papers, and personal communications. There may be others that I have missed. Treatment suggestions for the majority of these are included in the extended protocol section that follows the main protocols suggested for Covid-19 treatment.

Herbal Interventions for SARS-CoV-2 Prevention and Treatment

Here is the rationale underlying my suggested protocols:

My approach in the treatment of systemic inflammatory infections has always been to find plants that will counteract the actions of the organism involved—in this instance, SARS-CoV-2—then to cross-correlate those with each other to find the plants that are active in the most categories that will inhibit the infection and its cytokine cascades, and that have effectiveness for the symptoms the disease causes, and have a long historical record of use for treating such conditions. To find these I extensively research hundreds, sometimes thousands, of scientific and research journals and articles. I then look at both historical and contemporary use, which also involves researching a great many sources. The herbs chosen also have to be relatively easy to find.

The herbs I suggest here are not the only ones that can help during a Covid-19 infection; there are scores that will do so, many of which are listed in this material. However, that being said, I would strongly suggest that *Salvia miltiorrhiza* ***not*** be eliminated from the protocol under any circumstances (unless you absolutely cannot find a source for it or experience side effects from its use). In my opinion, given its effects in counteracting so many of the actions and impacts the virus has, it is crucial to successful treatment of this pathogen.

As you can tell from the list of herbs that affect various aspects of the virus, its infection, and its inflammation strategy, there are a number that are active in multiple areas, such as *Andrographis paniculata, Houttuynia cordata,* and *Polygonum cuspidatum*. These herbs can be blended in various ways to create your own protocols. Personally, I would always include *Isatis* spp., *Salvia miltiorrhiza, Scutellaria baicalensis,* and *Pueraria lobata*. I feel they are just too important in treating this infection.

Finding the Herbs

Some herbal companies are making the blends I suggest in these protocols; you will just have to look around online or ask to find them. Because several (insert *strong* expletive) herb companies utilized my name (without authorization) and quoted some of my comments on treating coronaviruses with herbs in order to increase their sales, the FDA and FTC began making house calls on them . . . to their dismay. So, despite a senior White House official touting unproven remedies (injecting or drinking bleach?) that are seriously dangerous, the government became quite upset with herbal companies making claims and made it a priority to shut them down. Thus the companies who are still making blends based on these suggestions have become, let us say, shy. The blends are out there, you just might have to ask if it is not listed on their websites.

Sources: You can generally find any herb or tincture you might need online (search for the botanical name and/or common name of the herb), and especially Etsy, which is home to a good number of small herb companies that are selling herbal tinctures you will not find anywhere else. They are often far better (as well as cheaper) than those made by huge corporations. Please see Sources of Supply (page 454) for the herb and tincture suppliers I would recommend.

If you cannot find the protocols preblended, you can blend them yourself. Just buy the individual herbal tinctures and mix them together. (To clarify: if I say three parts of one herb, buy 3 ounces, if I say one part of another herb, buy 1 ounce, then blend them together in that ratio.)

Note: The protocols I suggest for Covid-19 rely heavily on herbal tinctures. Some people tend to avoid tinctures due to their alcohol content. However, I absolutely believe that avoiding the use of tinctures will

not be beneficial with this infection. I have not found glycerin tinctures to be strong enough. *I do not have an alternative protocol for those who wish to avoid alcohol intake.* Please be aware that the amount of alcohol in tinctures is minimal; much of the content is water.

Children's dosages: A child's dose can be found by dividing the child's weight (in U.S. pounds) by 150 or 160. Thus if your child weighs 40 pounds, give them one-fourth the adult dose; if they weigh 50 pounds, give them one-third the adult dose.

And as always: If any adverse symptoms appear or if you feel something is off, *then stop taking the herbs*. Remember: You are the one who lives in your body, so you are the best person to determine whether something is working for you or not and if it feels right to your body when you take it.

You are the only one who truly knows how health feels to you. Always pay attention to that and never settle for less *no matter what any particular health "expert" tells you (including me).*

Overall, in my opinion, the most effective herbal approach to SARS-CoV-2 addresses three different situations: 1) reducing the chance of infection; 2) treatment of active infections; 3) treating post-coronavirus syndrome. Here are my suggestions.

Reducing the Chance of Infection

Besides all the endlessly cited (and now tiresome) admonitions about hand washing, masks, and self-isolation (and repeated ad nauseam by too many medical practitioners of various sorts, including herbalists), actively supporting a strong immune system is the best place to begin. Secondly, I think the daily intake of a systemic anti-inflammatory such as mangiferin or Japanese knotweed root, an anticoagulant and fibrinolytic agent such as lumbrokinase, and L-malic acid will help the system be prepared if an active infection does occur. Thus:

Pre-infection immune tincture formulation: *Eleutherococcus senticosus* (2 parts), *Astragalus* spp. (2 parts), *Cordyceps* spp. (1 part), *Rhodiola* spp. (1 part), *Glycyrrhiza* spp. (1 part). Dosage: 1 teaspoon 3x daily.

Systemic anti-inflammatory: The best I know of is a formulation of *Mangifera indica* standardized to 60 percent mangiferin. Its anti-inflammatory actions are *very* specific for the kinds of inflammation seen in damaged lungs and other organs. There are a great many very good studies on mangiferin and its actions in various organs for the treatment of systemic inflammation. The only good source in the United States at this time (that I know of) is Green Dragon Botanicals (https://greendragonbotanicals.com). Dosage: 200–600 mg 3x daily. Japanese knotweed root is also very good, especially since it stabilizes and protects endothelial structures: 1 teaspoon tincture 3x daily. (This herb is good for many problems that aging bodies experience since it is so high in resveratrol; no matter what is going on with you it is a good food-grade herb to take daily.)

Lumbrokinase: 600,000 IU (a.k.a. 40 mg) in the morning and again in the evening.

Taffix: Taffix is an Israeli-developed nasal spray, a powder, which, upon inhalation, forms a gel that covers the nasal mucosa. It has been found to give 4 to 5 hours of protection from viral infection. In one trial it significantly reduced Covid-19 infections in crowded, unmasked groups of people. It's legal for sale in the EU, with an attached claim that it reduces Covid-19 infections. It is not, as of this writing, available for sale in the United States, though it can be ordered from Israel through eBay. The spray has been found in lab studies to be 99 percent effective in blocking viral attachment to nasal membranes and is apparently effective (though to what extent is not yet known) against coronavirus variants. Given the rapidly emerging number of variants, I think it warrants serious consideration as an adjunct protection, in addition to masking, if you are going to be in crowded situations where participants may be unmasked.

Melatonin: Melatonin has emerged as a potentially crucial adjunct to helping prevent, reduce the severity of, and treat Covid-19 infections. One study showed that intubated patients who were given melatonin had "significantly" higher survival rates. As well, those taking melatonin have been found to have "significantly lower odds" of developing a Covid-19 infection, "much less dying of it" (Hamblin, 2020). Because insomnia is a very common symptom for the infected as well as those suffering post-coronavirus syndrome, the supplement is of additional

benefit; sleep disruption appears to be a consistent problem in all groups. There is also early research showing that the coronavirus can possibly be blocked by melatonin. Healthy sleep is, as well, essential for the body to deal with the infection, especially its damage to the brain. Dosage and form: I prefer liquid melatonin, which I take nightly (30 ml) when I get in bed; it seems to work better for me than tablet or capsule forms. The preeminent researcher on melatonin, Russell Reiter, takes 70 mg daily. Note: Since the supplement is used to promote sleep, taking it at bedtime is highly suggested, rather than earlier in the day.

And yes, you can use nattokinase or serrapeptase in place of lumbrokinase. However . . . lumbrokinase is 30 times stronger than nattokinase and 300 times stronger than serrapeptase. Because the clotting during Covid-19 is so severe, I think lumbrokinase the best approach. Serrapeptase has other functions that make it useful during infection (despite it not being a very good fibrinolytic agent): It modulates temperature fluctuations in the body, relieves sinus pressure and inflammation especially during infection, degrades fibrin (but not very well), breaks down mucus in the lungs, helps break down circulating toxins and cellular debris, is generally anti-inflammatory, and is especially good for helping relieve swelling and minor pains in the body. It is a very useful adjunct for lung conditions such as COPD. Nattokinase is best used for mild hypercoagulation problems and to break down fibrin in the body (including the lungs), while lumbrokinase is best for severe hypercoagulation problems and, as well, breaking down fibrin. Both enhance circulatory health. (Note: Some people think that earthworm-based forms of lumbrokinase are better than its synthetic, chemically produced forms. The best of these seems to be Canada RNA brand but it is very expensive; the dosage is half of the synthetic forms.)

Caution: Nattokinase and lumbrokinase should be used with caution if you are taking pharmaceutical "blood thinners."

Treatment of Active Covid-19 Infection

What is needed are plants that have the following actions:

1. **Specific antiviral action for the SARS-CoV group of viruses.** The strongest found so far are *Scutellaria baicalensis* (root—a potent systemic antiviral herb), *Isatis* spp. (root and leaf), *Houttuynia* spp. (leaf), *Lycoris radiata* (extremely potent but not easy to find), and the essential oil of bay laurel (*Laurus nobilis*—very strong as well). These are followed by *Glycyrrhiza* spp. (root), *Forsythia suspensa* (the fruit), and *Sophora flavescens*. *Lonicera japonica* and *Polygonum cuspidatum* are effective as antivirals for coronaviruses as a whole but have not, to my knowledge, been tested against the SARS group.
2. **ACE-2 interventions,** meaning herbs that:
   - Protect ACE-2 by blocking viral attachment. Specific for this are *Glycyrrhiza* spp., *Scutellaria baicalensis*, *Sambucus* spp., *Aesculus hippocastanum*, *Polygonum cuspidatum*, *Rheum officinale*, plants high in procyanidins and lectins (e.g., *Cinnamomum*) and luteolin.
   - Upregulate and protect ACE-2 expression, increase its activity (especially in the aged), and lower AngII. Herbs specific for this are *Pueraria lobata*, *Salvia miltiorrhiza*, *Ginkgo biloba*.
   - Inhibit ACE (in contrast to upregulating ACE-2) to increase the presence of ACE-2 and help protect the lungs from injury. *Crataegus* spp. and *Pueraria lobata* are specific. Remember: These are not drugs, they are *modulators*, and they do many other things besides this.
3. **Modulation of cytokine responses,** in general (*Salvia miltiorrhiza*—a cytokine adaptogen) and in specific: Plants that can inhibit TNF-α include *Andrographis paniculata*, *Cordyceps* spp., *Eupatorium perfoliatum*, *Glycyrrhiza* spp., *Houttuynia cordata*, *Pueraria lobata*, *Sambucus* spp., *Scutellaria baicalensis*, *Salvia miltiorrhiza*, and melatonin, not a plant but useful in this infection for a variety of reasons. IL-1β inhibitors include *Cordyceps* spp., *Eupatorium perfoliatum*, *Polygonum cuspidatum*, *Pueraria lobata*, *Salvia miltiorrhiza*, *Scutellaria baicalensis*. IL-6 inhibitors include *Andrographis paniculata*, *Isatis* spp., *Pueraria lobata*, *Salvia miltiorrhiza*, *Scutellaria baicalensis*, and melatonin. IL-8 inhibitors include *Cordyceps* spp., *Isatis* spp., *Polygonum cuspidatum*.

4. **Protection for endothelial cells.** *Polygonum cuspidatum, Salvia miltiorrhiza, Scutellaria baicalensis.*
5. **Protection for the spleen and lymph nodes and strengthening effects for the lymph system.** *Bidens pilosa, Galium* spp., *Salvia miltiorrhiza, Scutellaria baicalensis.*
6. **Protection against damage for the lungs, heart, kidneys, and brain.** The herbs already suggested will accomplish this for most of the organs without adding anything else. There will be additional suggestions in the extended protocol (see page 109). However, during active infection, to protect the kidneys, regular consumption of a strong nettle (*Urtica dioica*) infusion (see page 132) along with a tincture of nettle seed is highly recommended. As well, since heart damage is being found in a large number of those infected by the virus (in those with and without symptoms, in the young as well as the old), plants specific for minimizing or preventing that damage—hawthorn (*Crataegus oxyacantha*) and astragalus (*Astragalus* spp.)—are, I think, essential.

During active infection, continual use of standardized *Mangifera indica* at a higher dose, a higher dose of lumbrokinase (or nattokinase), and L-malic acid may also help protect the organs.

The use of both a nebulizer and a steam inhalant is strongly suggested for infection in the lungs as well as the use of plants that can stimulate lymph drainage from that organ (see page 106).

Use of the Protocol during Pregnancy

The majority of herbs in the protocol on the facing page appear safe, and historically have been used, during pregnancy. However, I would not use the protocol during the first trimester. Afterward, the following caveats apply:

Licorice: Can be used but with caution. Heavy exposure during early pregnancy (up to 38 weeks) has been found in a Finnish study to increase the likelihood of early-term birth. There is nothing to suggest its use in late pregnancy in small doses is unwarranted, and nothing I can find indicates that its use as a minor component in a blended formulation is unsound during pregnancy. It is ⅛ of the formulation, a relatively minor and certainly not heavy use of the herb.
Rhodiola: Two mouse studies found it to be very mildly toxic if taken during early pregnancy. Other found it safe for long-term use during pregnancy. I can't find any adverse reports from its traditional use for over 1,000 years; nevertheless, if concern is present, eliminate this herb.
Bidens pilosa: It's a weak uterine stimulant and may be used depending on dosage. However, I would avoid it.
Nettles: There are some mixed concerns regarding nettles, but I am not sure they are warranted. It has been used for centuries during pregnancy for nutritional support, like many greens. However, some recent studies indicate it has uterine activity despite the fact that there have been no reports of adverse events.
Lumbrokinase, nattokinase, or serrapeptase: No data on adverse events, but due to their anti-clotting actions, I would avoid them during pregnancy.
L-malic acid: I would avoid it.
Bay laurel essential oil (used for an active lung infection; see page 106): The literature is confusing. Bay leaf is commonly used in food preparation; there are no contraindications for its use in pregnancy. However, most lay and a few research papers recommend that the essential oil not be used in pregnancy. I can find no definitive reasons for this nor any reasons why inhalation of 1 to 2 drops of the essential oil in boiling water on the stove would be contraindicated. However, there is not enough clear data for me to determine safe use during pregnancy.

Core Protocol for an Active Infection

This protocol is composed of three tincture formulations and some suggested supplements. They should *all* be taken at the first signs of infection, and they should be continued for 2 weeks after the cessation of symptoms; otherwise the symptoms may recur.

1. Antiviral tincture blend formulation: *Scutellaria baicalensis* (3 parts), *Isatis* spp. (2 parts), *Pueraria lobata* (2 parts), *Glycyrrhiza* spp. (1 part). Dosage: 1 teaspoon 3x daily at onset; if infection becomes acute (i.e., more intense), 1 teaspoon 6x daily. The more serious the infection, the higher the dose. Note: *Houttuynia cordata* (2 parts), which is a very good antiviral for this organism, can also be added to the blend if desired or substituted for *Isatis* spp.
2. Immune tincture formulation: *Cordyceps* spp. (3 parts), *Eleutherococcus senticosis* (2 parts), *Rhodiola* spp. (1 part), *Astragalus* spp. (1 part). Dosage: 1 teaspoon 3x daily at onset; if infection becomes acute, 1 teaspoon 6x daily.
3. Cellular protection/cytokine modulation/spleen and lymph support tincture formulation: *Salvia miltiorrhiza* (3 parts), *Galium* spp. (2 parts), *Bidens pilosa* (1 part). Dosage: 1 teaspoon 3x daily at onset; if infection becomes acute, 1 teaspoon 6x daily.
4. *Urtica dioica* (nettle): 1 quart of infusion (see page 132) daily, plus ¼ teaspoon of nettle seed tincture 3x daily. (This is good for you for many reasons but with this infection it will help your kidneys stay healthier than they would without it. It may, under some circumstances, help prevent or allow recovery from dialysis, especially in the very early stages of kidney damage.)
5. *Crataegus oxyacantha* (hawthorn): 1,800 mg 2x daily.
6. *Mangifera indica* capsules, standardized to 60 percent mangiferin: 600–1,000 mg 3x daily (Green Dragon Botanicals brand: https://greendragonbotanicals.com).
7. Lumbrokinase (or nattokinase): 600,000 IU (a.k.a. 40 mg) 2–3x daily (and please use an oximeter to check blood oxygen levels daily).
8. L-malic acid: 600 mg 3x daily.
9. Probiotic: 1 capsule daily.
10. Vitamin D_3: May possibly be of use in reducing the severity of infection, especially for those over 55. Dosage: 10,000 IU daily.

To Address Active Lung Infection

In addition to the core protocol, I suggest three things to treat Covid-19 lung infection: bay laurel (*Laurus nobilis*) essential oil as a steam inhalant; the use of a nebulizer as outlined below; and guaifenesin (Mucinex or its equivalent).

BAY LAUREL ESSENTIAL OIL

This essential oil is potently antiviral for SARS viruses, and it can be used as an adjunct to kill the organism in the lungs.

Bay laurel essential oil as inhalant steam: Add 1 or 2 drops to a pot of boiling water on the stove. Turn the stove off, remove the pot from the stove and set it on a table, sit down, cover both your head and the pot with a towel, and breathe in for a while. (More than 2 drops will probably be too strong.) People have reported good success with bay laurel essential oil in reducing the impact of the infection on the lungs—some have said it eliminated the infection entirely. (And no, they probably won't let you do this in the hospital or a nursing home for either yourself or your loved ones.)

Note: Bay laurel essential oil can also be dabbed or misted on masks or gloves to kill any virus that lands on their surfaces.

NEBULIZER

The use of a nebulizer will help a lot. These are available inexpensively through pharmacies and many online outlets.

The nebulizer cups that come with these machines are often not very good. You will need to get a different one. Philips Respironics is the brand I suggest. You can get the cups on the internet but not from the company that makes them without a prescription—which I find rather idiotic. They make two kinds (also idiotic). One is very cheap and is listed as disposable (don't get it), and the other is listed as reusable. *Get the reusable one.* Just wash it out after use with very hot water and liquid dish soap. The reusable one will stand up to essential oils if washed well after use. Mine lasts months before I can find any evidence of degradation of the plastic. The disposable ones will begin to degrade from the essential oils within a few days and you will start inhaling microparticles of plastic. Very much *not* a good idea.

You will need saline solution for the nebulizer. I use Modudose saline solution for inhalation, one 5 ml container per session.

You'll also need effervescent glutathione capsules. Glutathione is a potent antioxident, normally present in the surfactant liquid in the lungs. People with severe lung infections and chronic conditions tend to have low levels of all antioxidants including glutathione in their lungs. Using this in the nebulizer (see the instructions below) will help reduce inflammation in the lungs. I think Theranaturals Reduced L-Glutathione Plus (enhanced absorption, ultra purity grade) is the best one to use.

Essential oils are also very useful. I use peppermint (*Mentha piperita*) and eucalyptus (*Eucalyptus* spp.). The peppermint is strongly antispasmodic (helping coughing); both of the essential oils will help thin and liquify mucus and help it move up and out of the lungs, thus enhancing breathing and oxygen exchange. (Note: A drop of oregano essential oil can help reduce or stop the development of a lung infection . . . though not always. Nevertheless it is a good thing to try at early onset. Other suggestions are in the extended protocol that follows [see section 2.0, on the respiratory system, beginning on page 111]. And if essential oils are too strong for you, eliminate them.)

To set up the nebulizer: Pour 5 ml of saline solution into the nebulizer cup. Add the contents of a single 200 mg capsule of glutathione and let it dissolve. (It will fizz and foam when you first put it in the liquid . . . after you have finally gotten the capsule apart, that is.) Then, just before using the nebulizer, add 1 or 2 drops of peppermint essential oil and 1 or 2 drops of eucalyptus essential oil.

GUAIFENESIN

An over-the-counter guaifenesin tablet, such as Mucinex, will, along with the rest of the nebulizer protocol, thin and help move mucus up and out of the lungs. Dosage: 1 tablet (600 mg) in the morning and another in the evening. (I prefer extended-release tablets, but there are also non-extended-release forms, and they all work fine.)

To Protect the Kidneys

Again, nettle infusion daily along with nettle seed tincture. (See the core protocol on page 105.)

To Protect the Heart

Researchers are finding that heart damage (especially myocarditis) is a regular occurrence in people infected by this virus. For some people it will not resolve after infection. It is often not apparent until the person is under physical stress. Many of the people who have prolonged heart damage did not show any symptoms of Covid-19 infection at all; most of them are young, not old. Given this, it is essential that heart-protective herbs be taken if the virus is endemic in your area, if people around you are being infected, or if you yourself become infected. I'd suggest the following:

- ***Crataegus oxyacantha* (hawthorn),** 900 mg 2x daily as a protective measure; for an active infection, 1,800 mg 2x daily, as noted in the core protocol on page 105.
- ***Astragalus* spp.,** 1,000 mg 3x daily.

To Address GI Tract Exacerbations

To help with the symptoms of GI tract infection, e.g., cramping and diarrhea, I have found the following to be very helpful.

For cramping: *Viburnum prunifolium* (a.k.a. cramp bark) and other related species. Dosage: 30 to 90 drops of tincture up to 6x daily. This can take anywhere from a few minutes to a few days to kick in but it does help when it does. *And/or:* Peppermint—either capsules that include the essential oil *or* those really tiny coffee mints that are incredibly strong . . . just swallow 3 or 4 of them as needed.

For diarrhea: *Rubus villosus* (a.k.a. blackberry) root. Take it as a strong decoction: Put 1 to 2 ounces of the root in 2 quarts of water. Bring to boil and simmer until the liquid is reduced by half. Cool and then consume during the day. Repeat every day until the diarrhea is under control. Note: This should also help control any bleeding that is occurring. *Please* do not buy blackberry root tea bags, they are useless. Do not try to substitute raspberry root either, it is not nearly as good and you will probably end up with the leaves anyway, which are not nearly as strong. If you have trouble finding blackberry root (for some reason very few herbal companies carry this herb), try the herb shops on Etsy.

Also: *Ailanthus altissima* (tree of heaven) is another powerful (and underutilized) herb that is very good for a number of problems that

occur during Covid-19 infections, including diarrhea. It is the inner bark that is used (that is, the white bark that peels off easily, which is located just under the very thin green outer bark). This is an invasive botanical throughout the United States and much of the EU and thus pretty easy to find. *Other actions of the herb:* bronchial dilator, anti-inflammatory (especially for the lungs), antifibrotic (especially in the lungs), antiasthmatic, strong antioxident, antiviral, antimicrobial, antimycotic, antimalarial.

Note: Tincture of goldenseal (*Hydrastis canadensis*) or any of the other berberine-containing plants may be of use; they can sometimes initiate strong healing of the GI tract.

Extended Symptom-Specific Protocol for Treatment of Covid-19 and Post-Coronavirus Syndrome

1.0 Fatigue

A. Acute fatigue

1. *Eleutherococcus senticosus* tincture, in a 1:1 or 2:1 formulation (made by Herb Pharm and some others), taken as directed on the product label. Stop every 10 days for a few days, then begin again. When the fatigue becomes less severe, switch to the 1:5 formulation.
2. Glutrasol IE (a commercial supplement), taken as directed on the product label.
3. D-ribose powder, taken as directed on the product label.

B. Chronic fatigue

1. *Eleutherococcus senticosus* tincture, in a 1:5 formulation as a tonic, ½–1 teaspoon 3–6x daily, and/or . . .
2. Chronic fatigue formula (see 1.1, page 110): ¼ cup of the powder, blended in juice or water, in the morning and again just before bed, and/or . . .
3. D-ribose, in capsule form, up to 3,400 mg in the morning and at noonish, or 1 scoop of powder in liquid in the morning and at noonish, and/or . . .
4. Glutrasol IE (a commercial supplement): 1 scoop of powder in liquid daily.

C. For adrenal fatigue, add:

1. *Pinus* spp. (pine) pollen tincture, ¼–½ teaspoon 3x daily (take by mouth, let sit a minute, then swallow; do not dilute in water), and/or . . .
2. *Glycyrrhiza* spp. (licorice) tincture, ¼ teaspoon 3x daily (not to exceed 30 days), and/or . . .
3. *Lepidium meyenii* (maca) powder, 1 teaspoon 2–3x daily, and/or . . .
4. *Rhodiola* spp. tincture, 10–40 drops 2–4x daily, and/or . . .
5. *Codonopsis pilosula* tincture, ¼ teaspoon 4x daily.

D. For thyroid fatigue, add:

1. *Juglans nigra* (black walnut) hull tincture, 5–10 drops 2x daily, and/or . . .
2. Selenium, 200 mcg daily, and/or . . .
3. Kelp, 500 mg every other day, and/or . . .
4. *Rhodiola* spp. tincture, 10–40 drops 2–4x daily.

E. For mitochondrial fatigue, add:

1. *Leonurus cardiaca* (motherwort) fresh plant tincture, ½–1 teaspoon 3x daily, and/or . . .
2. Nicotinamide riboside (an NADH precursor), 900 mg daily during acute fatigue, 300 mg daily for mild, and/or . . .
3. NADH (nicotinamide adenine dinucleotide hydride, or NAD+), 10–20 mg 2x daily, and/or . . .
4. D-ribose, in capsule form, up to 3,400 mg in the morning and at noonish, or 1 scoop of powder in liquid in the morning and at noonish, and/or . . .
5. L-arginine, 1,000 mg 3x daily, and/or . . .
6. L-carnitine (500 mg 3x daily), alpha-lipoic acid (200–600 mg daily), coenzyme Q10 (60–150 mg daily).

1.1 Chronic Fatigue Formula

This is *very* specific for reversing fatigue, especially if it is chronic. Note: All the herbs must be *powdered*. (You can find this formula, preblended, from various sources if you do a quick search online. Etsy is a good place to look.)

You'll need:

- 2 parts (for example, 4 ounces) *each* of astragalus, dandelion root, licorice, milk thistle seed, nettle leaf, spirulina, and turmeric
- 1 part (for example, 2 ounces) *each* of ashwagandha, bladder wrack, burdock root, chlorella, eleuthero, and dried wheat grass juice powder

To make: Blend all the powdered herbs well in a *very* large bowl.

Dosage: In cases of very severe, acute fatigue (e.g., mono), I normally suggest ¼ cup of the powder, blended in a blender in water or juice, in the morning and evening just before bed. For ongoing, continual fatigue (where you are not bedridden), I suggest taking it only before bed. (Some people report being kept awake on this, and if so, take it before dinner; it doesn't bother me.) The dose can be adjusted up or down as necessary. Note: These are food-grade herbs, just like broccoli . . . well, okay broccoli is not actually edible . . . like red chard then.

2.0 Respiratory System

Covid-19's involvement with the respiratory system, during infection and in long haulers, can be broken down into two categories: upper and lower.

2.1 Upper Respiratory

A. Sinus problems

1. Sinusitis, ongoing (including infection):

- **a.** Cold Snap, taken as directed on the product label.
- **b.** Black seed (*Nigella sativa*) oil, 2,000 mg 1–3x daily.
- **c.** Xlear Nasal Spray, as needed.
- **d.** Caprylic acid, taken as directed on the product label.

2. Sinus pain: serrapeptase, 120,000 SPU 2–3x daily.

3. Congestion:

- **a.** Myrtol (a.k.a. GeloMyrtol Forte), taken as directed on the product label.
- **b.** *Monarda* spp. (bee balm) tincture, 20–30 drops as needed.
- **c.** Xlear Nasal Spray, as needed.

4. Burning:
   a. Homeopathic Cantharis 30C, taken as directed on the product label.
   b. Homeopathic Gelsemium 30C, taken as directed on the product label.
5. Sneezing (with drippiness): homeopathic Sulphur 30C, taken as directed on the product label.
6. Postnasal drip:
   a. Myrtol (a.k.a. GeloMyrtol Forte), taken as directed on the product label.
   b. Homeopathic Sulphur 30C, taken as directed on the product label.
   c. Xlear Nasal Spray, as needed.

B. Sore throat: *Echinacea angustifolia* tincture (do not use *E. purpurea*), half a dropper or so of tincture in the mouth, hold until saliva is stimulated, then let the tincture dribble slowly down the back of the throat. Repeat as needed.

C. Loss of smell: If the core protocol (page 105) does not restore function, try these. They work best with smell, and to some extent with taste. The first two are the most reliable (so far). (About two-thirds of people recover their sense of smell after the first 2 days. Another 20 percent recover their sense of taste after using the aspirin/ivermectin combination. Nearly all people recover some or all of their sense of smell after the final aspirin/ivermectin/L-lysine combination.)

1. Zinc/quercetin combination. Dosage: zinc, 50 mg daily; quercetin, 200–1,000 mg daily (800 mg suggested).
2. Ivermectin/aspirin combination treatment. (This is complicated, as all forebrain people make things, but it does seem to work.) To begin, reduce arginine-rich foods in the diet, including coffee, soft drinks, and all citrus fruits. Then:
   a. Ivermectin, 0.2 mg per kg of body weight daily for 2 days, taken after dinner. If not resolved by second day, then switch to . . .
   b. Aspirin, 100 mg after breakfast and 100 mg after dinner for 5 days (from day 3 to 7). On days 5 and 6, take ivermectin again, now at 0.4 mg per kg of body weight daily; take half the dose after lunch, the rest after dinner. If not resolved by the morning of day 8, then . . .

   c. Continue taking aspirin, same dosage and times, and start taking L-lysine, 500 mg daily. Every 3 days, increase the L-lysine dosage by 500 mg until you are at 2,000 mg per day. On the eighth day after beginning the L-lysine, start ivermectin again, 0.4 mg per kg daily in two divided doses for 3 days. Then stop the protocol. If it has not worked by now, it probably will not.

3. Olfactory training. The process, which uses essential oils to retrain the sense of smell, takes several months but seems to be effective for most people if diligently done. Do an internet search for "olfactory training"; there are several companies that specialize in it (one by someone who suffered loss of smell), their directions are easy to understand, and they seem very responsive to inquiries. Google Scholar will lead you to a number of studies on its effectiveness.

4. Acupuncture and traditional Chinese medicine. A number of studies found that acupuncture with or without traditional Chinese medicine is effective in restoring a sense of smell and, to some extent, taste.

5. Chamomile nasal irrigation. Make a decoction of chamomile (bring to boil, reduce heat, and let simmer until water is decreased by half, then strain very well). Use it with a neti pot for nasal irrigation daily for a week (ick), or put the decoction into a nasal sprayer and use 3x daily for a week.

6. Lion's mane (*Hericium erinaceus*). This herb is fairly good at restoring damaged neural structures in the brain and body. There are some reports of it helping restore sense of smell. Dosage: tincture, ½ to 1 teaspoon 3x daily.

D. Loss of taste

1. The above protocols for loss of smell (especially 1 and 2) can help with this.

2. Monosodium glutamate (MSG), used as directed on the product label. Though MSG has a bad reputation, more recent research has found that unwarranted. MSG enhances the sensitivity of the taste buds to the taste of food. It has, for some people, helped resensitize the sense of taste after Covid-19 infection.

2.2 Lower Respiratory

A. General: Continue with the nebulizer protocol (page 106); this will help clear mucus and help breathing and oxygen intake.

B. Persistent, uncontrollable cough

1. Oxygen generator/concentrator, used as needed. Most of the standing machines have settings that go to 5 (a few go to 10). Use setting 2, at most 3.
2. Tramadol (an opiate, by prescription, and due to the current opiate hysteria, hard to get). Some people prefer to use 50 mg twice daily; I have found the 100 mg extended-release capsule once daily preferable, but this is simply a matter of individual taste and response.
3. Herbs that stimulate the vomiting reflex are sometimes specific for severe uncontrollable cough. (The point is to *stimulate* the reflex, not activate it.) Ipecac, once a staple in every medicine cabinet in the United States, is a case in point but is now, thanks to the FDA, impossible to get. However . . .
   a. *Sambucus* spp., fresh (that is, *nondecocted*) leaf tincture, up to 30 drops as needed. Note: Decocted tinctures (which deactivate the compounds that cause nausea and/or vomiting) are available but for this the nondecocted is more effective (if it is going to work for you at all). Extended use may cause watery diarrhea.
   b. *Lobelia inflata*, fresh or dried leaf tincture, 5–20 drops as needed, or the dried seed tincture, 3–10 drops as needed. The dried leaf is far more nausea inducing than the fresh leaf or seed and may be more useful for stopping severe coughing. For some people the plant is also a strong emetic, I, however, have not found it so. Note: This tincture can also help move mucus up and out of the lungs; see section D (facing page).
4. *Echinacea angustifolia* root tincture can anesthesize the back of the throat and to some extent the bronchi if a half dropper of tincture is taken, held in the mouth until saliva is stimulated, and then slowly dribbled down the back of the throat. Repeat as needed.
5. Western skunk cabbage (*Lysichiton americanus*) can sometimes help; see section D (facing page).
6. Other herbs and herbal combinations might be useful as well; please see section C (facing page).

C. Cough, general

1. Nebulizer with peppermint essential oil can help, sometimes significantly. Peppermint is specific for spasming. It works just as well in the lungs as the GI tract.
2. *Desmodium* spp. leaf tincture (1:5 formulation, 50% alcohol), 1 teaspoon up to 6x daily. It may also be used in cough syrups; it is an excellent underused herb.
3. *Aster tataricus* root tincture (1:5 formulation, 50% alcohol), ½–1 teaspoon up to 6x daily; another excellent underused herb.
4. *Pelargonium sidoides* (umckaloabo) tincture (1:5 formulation, 50% alcohol), 30 drops up to 6x daily.
5. Myrtol (a.k.a. GeloMyrtol Forte), taken as directed on the product label.
6. *Hedera helix* (English ivy), as tea, often combined with . . .
7. *Thymus vulgaris*, as tea with or without ivy, or combined in cough syrup.

D. Mucus, excessive, in the lungs (with cough or not): Mucus buildup is often a problem during lung infections and in damaged lungs. The buildup of mucus in the lungs is bad for a number of reasons: It inhibits depth of breathing thus lowering blood O_2, is a fertile ground for pathogenic organisms, and by itself stimulates the cough reflex . . . which will not stop until you get it out. If you are suffering post-coronavirus syndrome and you have persistent mucus buildup in your lungs you will need to develop a daily regimen to get the mucus out. There are a number of things that can help. Use as many of them daily as you can. (Xlear Nasal Spray, as needed, will also help.)

1. *Lysichiton americanus* (western skunk cabbage) *freshly* dried root tincture (the well-dried root is far less effective). Dosage: As desired or needed—normally, what I use for myself is around 30 drops whenever I want or feel like I need some.
2. Guaifenesin tablets, 600 mg daily. Mucinex is a good one but others work well. Guaifenesin is a compound isolated from plants in the *Guaiacum* genus. It will thin and help stimulate the expectoration of mucus from the lungs. It is only minimally a cough suppressant and only then because there is less mucus in the lungs.
3. Nebulizer with essential oils of peppermint and eucalyptus daily.

4. Fresh ginger juice tea (see page 39), 3–6x daily. Extremely good for thinning mucus.
5. Other mucus-thinning herbs of note: *Desmodium* spp., *Aster tataricus*, fennel, fenugreek, yerba santa (*Eriodictyon* spp.), thyme, English ivy, coltsfoot, cayenne, osha, *Pelargonium sidoides*, Myrtol (a.k.a. GeloMyrtol Forte), and so on.
6. Flutter device. Smiths Medical acapella is a decent one. This will help break up mucus in the lungs and stimulate expectoration. Many people use them. They work better if you are also using herbs that thin the mucus.
7. Inversion table. If you have an inversion table, lying on one daily can help the mucus flow upward, stimulate cough, and help it move out of the system, especially if you are taking herbs that thin the mucus. (I didn't find it particularly helpful but many people do.)

E. Hemoptysis (coughing up blood)

1. Yin Qiao San (a traditional Chinese medicine, or TCM, formulation), taken as directed on the product label. Note: You can find this formula by searching online.
2. Ke Xue Fang (another TCM formulation), taken as directed on the product label. Note: This formulation is generally available only to licensed practitioners; if you're not a practitioner, you could try Green Dragon Botanicals (https://greendragonbotanicals.com).
3. Huai Jiao Wan (one good brand-name version is called Sophora Support), taken as directed on the product label. Note: You can find this formula by searching online.
4. *Desmodium* spp. leaf tincture (1:5 formulation, 50% alcohol), 1 teaspoon up to 6x daily.
5. *Cinnamonum* spp. (cinnamon) tincture (60% alcohol, 5% glycerin), 20–50 drops 4x daily.
6. Combination tincture formula: equal parts of *Polygonum cuspidatum, Echinacea angustifolia,* and *Salvia miltiorrhiza* tinctures, ½–1 teaspoon up to 6x daily.

F. Shortness of breath (dyspnea)

1. Severe:
   a. Liquid chlorophyll (the ChlorOxygen brand is often used), 1 tablespoon in 20 ounces water, drink throughout the day, and/or . . .
   b. *Ailanthus altissima* tincture, 10 drops–½ teaspoon 4x daily, and/or . . .
   c. *Lysichiton americanum* (western skunk cabbage) freshly dried root tincture, 30 drops as needed or desired.
2. Mild: same as above, plus . . .
   a. *Cordyceps* spp. tincture, 1 teaspoon 3x daily, and/or . . .
   b. *Polygonum cuspidatum* (Japanese knotweed) root tincture, ½ teaspoon 3–6x daily, and/or . . .
   c. *Astragalus* spp., 1,000–4,000 mg 3–4x daily.

G. Hypoxia

1. *Lysichiton americanus* (western skunk cabbage) freshly dried root tincture, 30 drops as needed or desired.
2. *Rhodiola* spp. tincture, 10–40 drops 2–4x daily.

H. Wheezing

1. *Ammi visnaga* (khella) tincture (1:5 formulation, 60% alcohol), 60–120 drops up to 4x daily. Capsules are also helpful.
2. *Datura* spp. fresh leaf tincture, 5–10 drops as needed.
3. *Lysichiton americanus* (western skunk cabbage) freshly dried root tincture, 30 drops as needed or desired.

I. Rattling breath (i.e., crackling or Velcro sounds): This is common in chronic lung conditions. It is caused by mucus building up in the bronchioles in the lungs. When you breathe in or out, the air has to move through the mucus, which makes the sound. Clearing the mucus will help. See section D (page 115).

J. Lung burn

1. Xie Bai San (TCM formulation), taken as directed on the product label. Note: This formulation is generally available only to licensed practitioners; if you're not a practitioner, you could try Green Dragon Botanicals (https://greendragonbotanicals.com).

2. Ma Xing Gan Shi Tang (TCM formulation; again, generally available only to practitioners), taken as directed on the product label.
3. Combination tincture formula: 1 part goji berry (*Lycium chinense*) tincture, 1 part white mulberry (*Morus alba*) tincture, 1 part white peony root (*Paeonia lactiflora*) tincture, ½ part licorice (*Glycyrrhiza* spp.) tincture. Dosage: 1 teaspoon in the liquid of your choice 3–6x daily depending on the intensity of symptom. (Note: The first three herb tinctures can be a little tricky to find. The best place to look is Etsy. And again, in my experience, glycerites are *not* strong enough.)

K. Chest pain (including tightness in the chest)

1. Pea protein, taken as directed on the product label, 1–2x daily. (Note: I use the Jarrow Formulas brand.)
2. *Piper methysticum* (kava) 10:1 extract, as an instant powder, in a cup of hot water (with honey and cream), 1–3 cups daily as needed.
3. Combination tincture formula: equal parts of motherwort (*Leonurus cardiaca*) and *Pedicularis bracteosa* (i.e., lousewort, which I prefer, for taste reasons, over *Pedicularis groenlandica*, i.e., elephant head, though either works fine). Dosage: 1–2 tablespoons as needed, in liquid.
4. *Pulsatilla patens* (pasque flower) fresh flower tincture, 5–10 drops as needed.

L. Pleurisy (inflammation of the pleural sac)

1. *Asclepias tuberosa* (pleurisy root) tincture, 30–90 drops 3x daily. (Note: All *Asclepias* species are useful for this.)
2. *Mangifera indica* capsules, standardized to 60 percent mangiferin, 200–600 mg 3x daily (Green Dragon Botanicals brand: https://greendragonbotanicals.com).

M. Chronic bronchitis

1. Si Ni Tang (TCM formulation of aconite, ginger, licorice), 4 capsules 3x daily. Note: Best if used with ephedra (and yes, I still sometimes order ephedra from China irrespective of what the FDA thinks I should do; it's a good herb but meth heads ruined it for the rest of us).
2. *Desmodium* spp. leaf tincture (1:5 formulation, 50% alcohol), 1 teaspoon up to 6x daily.
3. *Aster tataricus* root tincture (1:5 formulation, 50% alcohol), ½–1 teaspoon up to 6x daily.

4. *Pelargonium sidoides* (umckaloabo) tincture (1:5 formulation, 50% alcohol), 30 drops up to 6x daily.

N. Recurrent lung infections

1. Combination tincture formula: 2 parts *Lomatium* spp., 2 parts *Echinacea angustifolia*, 2 parts *Glycyrrhiza* spp. (licorice), 2 parts *Ceanothus* spp. (red root), 2 parts *Bursera microphylla* (elephant tree), 1 part decocted *Sambucus* spp. (elder) leaf or bark, 1 part *Asclepias asperula* (inmortal; pleurisy root will do but is not as good), 1 part *Ligusticum porteri* (osha), 1 part *Inula helenium* (elecampane), 1 part *Isatis* spp. (root or leaf or combination of the two), 1 part *Eriodictyon* spp. (yerba santa). Dosage: 30–60 drops each hour until the infection resolves.
2. Gan Mao Ling, 5–6 tablets 6x daily during active infection. Use this formula in concert with the lomatium combination tincture formula above (since lung infection in those with compromised lungs is a serious issue, such infections need to be reduced as rapidly as possible).

O. To inhibit, reduce, or repair fibrosis (scarring) of the lung

1. Combination tincture formula: equal parts of *Angelica sinensis, Salvia miltiorrhiza, Lonicera japonica, Polygonum cuspidatum, Cordyceps* spp. Dosage: 1 teaspoon 3–6x daily depending on the severity of fibrosis, and . . .
2. Lumbrokinase or nattokinase, 600,000 IU (a.k.a. 40 mg) 2–3x daily. (Note: If you are already taking anticoagulants, caution is warranted in adding either of these.)

Western Skunk Cabbage

This herb (*Lysichiton americanus*) has a great deal of usefulness in chronic lung conditions; it increases O_2 levels in the blood, lowers cough levels (even when intense), and, *importantly*, liquifies and then stimulates expectoration of mucus from the lungs, copiously. Note: I have not used the eastern variety and I am not sure it will do the same thing (though I have been told it will). The western variety is a bit hard to find.

3.0 Neurological/Brain Problems

A. Specific

1. *Uncaria rhynchophylla* tincture, ½–1 teaspoon 3–6x daily, depending on the severity of the brain infection.
2. Tryptophan, 1,500 mg 3x daily. (Note: Will lower brain inflammation and decrease a number of psychological/physiological symptoms.)

B. With severe brain/central nervous system involvement, add:

1. *Scutellaria baicalensis* tincture, increase the current dose, plus . . .
2. *Chelidonium majus* (greater celandine) tincture, ¼ teaspoon 3x daily, plus . . .
3. *Pueraria lobata* (kudzu) root tincture, ¼ teaspoon 3–4x daily.
4. N-acetylcysteine, 2,000 mg 2x daily, may also help, as will . . .
5. *Leonurus cardiaca* (motherwort) fresh plant tincture, ¼–½ teaspoon up to 6x daily.

C. To reduce neurotoxins in the brain (e.g., quinolinic acid), add:

1. *Sida cordifolia* tincture, 5–40 drops up to 3x daily, and/or . . .
2. *Angelica sinensis* tincture, ¼–½ teaspoon 3x daily, and/or . . .
3. Melatonin, 3–9 mg daily.

D. When the brain "feels toxic," add *Centella asiatica*, 500 mg or ¼ teaspoon tincture 2x daily. (Note: May cause headaches.)

E. With low brain energy, add acetyl-L-carnitine, 500 mg 2x daily. (Note: Contraindicated if seizures are present.)

F. With brain "pressure," add *Pueraria lobata* (kudzu) tincture, ¼–½ teaspoon 3x daily.

G. With hand or body tremors, add:

1. *Sida acuta* (or equivalent species) tincture, 5–40 drops 3x daily, and/or . . .
2. *Scutellaria baicalensis* tincture, ½ teaspoon 3x daily, and/or . . .
3. *Mucuna pruriens* (an L-dopa precursor), 500 mg 1x daily in morning.

H. With brain fog, memory issues, cognitive dysfunction, or trouble finding words, add:

1. Phosphatidylserine, 100 mg 3x daily, and/or . . .
2. *Ginkgo biloba*, as standardized capsules, 150 mg 2x daily, and/or . . .

3. *Centella asiatica* (gotu kola), 500 mg or ¼ teaspoon tincture 2x daily (may cause headaches), and/or . . .
4. Taurine, 125 mg 3x daily.
5. Some of the following may also be of use:

   - Phosphatidylcholine, 500 mg 3x daily.
   - *Cordyceps* spp. powder, 1 teaspoon–1 tablespoon 3x daily, or tincture, 1 teaspoon 3x daily.
   - *Pueraria lobata* (kudzu root), 500–1,000 mg or ¼–½ teaspoon tincture 3x daily.
   - *Polygala tenuifolia* (Chinese senega root) tincture, 30 drops 3x daily.
   - *Hericium erinaceus* (lion's mane), 1 teaspoon powder or ¼–½ teaspoon tincture 3x daily.
   - Quercetin, 1,200 mg daily.
   - Pycnogenol (from French maritime pine bark only), 100 mg 1x daily.
   - Vitamin D_3, 5,000–10,000 IU daily.
   - *Bacopa monnieri* (especially for short-term memory help), 500 mg 2x daily.
   - Homeopathic Kali Phos 30C, 4 pellets 3x daily.

I. With hypoperfusion of the brain, add *Ginkgo biloba*, as a standardized tincture, ¼ teaspoon 3x daily, or as standardized capsules, 125 mg 3x daily.

J. With neural pain, add:

1. *Chelidonium majus* (greater celandine) tincture, ¼ teaspoon 3x daily, and/or . . .
2. *Pueraria lobata* (kudzu) root tincture, ½ teaspoon 3–4x daily, and/or . . .
3. *Melissa officinalis* (lemon balm) tincture, ½ teaspoon 3–4x daily, and/or . . .
4. Homeopathic Kali Phos 30C, 4 pellets 4x daily.

K. With a "buzzing" or "electric feeling" in the nerves, add:

1. *Sida acuta* (or equivalent species) tincture, 5–40 drops 3x daily.
2. *Pulsatilla patens* (pasque flower) tincture, 5–10 drops as needed.
3. *Piper methysticum* (kava) 10:1 extract, as an instant powder, in a cup of hot water (with honey and cream), as needed or desired.
4. Vitamin B_{12}, 1,000 mcg sublingually.
5. *Cannabis indica*, smoked or as an edible (5 mg).

L. With epilepsy/seizures, add:

1. *Uncaria rhynchophylla,* in an increased dose of up to 1 tablespoon 6x daily depending on the severity of the seizures, and also take . . .
2. *Gastrodia elata* tincture, ¼–½ teaspoon 3–6x daily.
3. *Salvia miltiorrhiza* may also be of help; it's already part of the core protocol for active infection, and here you can increase the dose to 1 tablespoon 3–6x daily, depending on the severity of the seizures, and/or . . .
4. *Cannabis* spp. oil or equivalent, variable dosages, and/or . . .
5. *Cryptolepis sanguinolenta* tincture, ½ teaspoon 3–6x daily, and/or . . .
6. Taurine (which sometimes helps), 125 mg 3x daily.
7. Frankincense essential oil, applied topically, daily, to the temples and base of skull may help alleviate severity of seizures.

M. With left temporal strokes, add:

1. *Salvia miltiorrhiza,* in an increased dose of up to 1 teaspoon 6x daily, and/or . . .
2. *Uncaria rhynchophylla,* in an increased dose of up to 1 teaspoon 6x daily, and/or . . .
3. *Ginkgo biloba,* as a standardized tincture, 1 teaspoon 3–6x daily, or as standardized capsules, 600 mg 3x daily.

N. With subarachnoid hemorrhage, add melatonin, 3–9 mg daily.

O. With bouts of unrestrained rage, add:

1. *Uncaria rhynchophylla,* in an increased dose of up to 1 teaspoon 6x daily, and/or
2. *Cryptolepis sanguinolenta* tincture, ½ teaspoon 3–6x daily, and/or . . .
3. Tryptophan, 1,000–1,500 mg 3x daily.

P. With a feeling of the brain being "on fire," add homeopathic Gelsemium 30C, 4 pellets 4x daily.

Q. To restore neuronal structures, add neural regrowth stimulants:

1. *Polygala tenuifolia* (Chinese senega root) tincture, 30 drops 3x daily, and/or . . .
2. *Hericium erinaceus* (lion's mane) powder, 3–8 grams per day, or 1 teaspoon tincture 3–4x daily.

R. When the limbs feel heavy, add *Centella asiatica* (gotu kola), 500 mg or ¼ teaspoon tincture 2x daily.

3.1 Muscle Twitches, Tingling/Crawling Sensations/ Numbness in the Extremities

A. General

1. Vitamin B_{12}, 1,000 mcg daily (lower the dose to 500 mcg as symptoms resolve), and/or . . .
2. Vitamin B_6, 100 mg 2x daily (lower the dose to 50 mg as symptoms resolve), and/or . . .
3. Folic acid, 400 mcg daily, and/or . . .
4. Magnesium, 200–400 mg up to 3x daily, and/or . . .
5. *Sida acuta* tincture, 5–40 drops 3x daily.

B. With numbness, add:

1. *Polygonum cuspidatum* (Japanese knotweed) root tincture, ½ teaspoon 6–10x daily. (Note: Especially useful for carpal tunnel—and lateral epicondylitis—type problems.)
2. *Ginkgo biloba,* as a standardized tincture, 1 teaspoon 3–6x daily, or as standardized capsules 600 mg 3x daily.
3. Fresh ginger juice tea (see page 39), 3–4 cups daily.

3.2 Anxiety/Hysteria/Extreme Fear/Panic Attacks

A. General

1. *Pulsatilla patens* (pasque flower) tincture, 10 drops each hour for as long as necessary, and/or . . .
2. *Leonurus cardiaca* (motherwort) fresh plant tincture, ¼–½ teaspoon up to 6x daily, and/or . . .
3. *Corallorhiza maculata* (coral root), or equivalent species, tincture, 30 drops (full dropper) up to 6x daily, and/or . . .
4. Homeopathic Gelsemium 30C, 4 pellets 4x daily, and/or . . .
5. *Scutellaria baicalensis* tincture, ¼–½ teaspoon 3x daily, and/or . . .
6. *Verbena officinalis* (vervain) tincture, 30 drops up to 6x daily, and/or . . .
7. *Uncaria rhynchophylla* tincture, 30 drops up to 6x daily, and/or . . .
8. Tryptophan, 1,000–1,500 mg 3x daily.

B. With inconsolable anxiety, add homeopathic Aconite 30C, 4 pellets dissoved in ½ cup water, sipped throughout the day.

3.3 Sleep Disturbance/Insomnia

A. General

1. Melatonin liquid, taken as directed on the product label, an hour before bed, and/or . . .
2. *Withania somnifera* (ashwagandha) tincture, ½ teaspoon an hour before bed, or powder or capsules, 1 gram an hour before bed, and/or . . .
3. *Scutellaria baicalensis* tincture, ½–1 teaspoon 3x daily, and/or . . .
4. *Leonurus cardiaca* (motherwort) fresh plant tincture, ¼ *ounce* (yes, that is right) in liquid just before bed (if the melatonin does not help), and/or . . .
5. Suan Zao Ren Tang tablets/pellets (look for the Plum Flower brand of this TCM formula, which you can find by searching online), 5 tablets just before bed, and/or . . .
6. Te Xiao Zao Ren An Mian Pian (look for Sleepeace, a version of this TCM formula from the manufacturer Guang Ci Tang), 5 tablets just before bed, and/or . . .
7. Glycine, 125–375 mg daily, and/or . . .
8. Tryptophan, 1,000 mg just before bed, and/or . . .
9. *Cannabis indica* gummies, 5 mg just at bedtime.

B. For bolting awake in middle of night, add:

1. Phosphatidylserine, 100 mg 3x daily, and/or . . .
2. *Withania somnifera* (ashwagandha), ½ teaspoon of tincture or 1 gram powdered or in capsules an hour before bed, and/or . . .
3. *Schisandra chinensis* tincture, ½ teaspoon just before bed, and/or . . .
4. *Cannabis indica*, various formulations.

3.4 Depression

A. General

1. *Eleutherococcus senticosus* tincture, in a 1:1 formulation, ¼–½ teaspoon 3x daily (with a break every 10 days), and/or . . .
2. Melatonin, 3–9 mg daily, and/or . . .
3. *Mucuna pruriens*, 500 mg 1x daily in the morning, and/or . . .
4. *Leonurus cardiaca* (motherwort) fresh plant tincture, ¼–1 teaspoon as often as needed, and/or . . .
5. *Corallorhiza maculata* (coral root), or equivalent species, tincture, ½–1 teaspoon up to 6x daily, and/or . . .

6. SAMe, 200 mg 1–2x daily, and/or . . .
7. Tryptophan, 1,000–1,500 mg 3x daily, and/or . . .
8. *Mitragyna speciosa* (kratom) powder, ½ teaspoon mixed in warm water, 1–3x daily (may cause jitteriness—or nausea at higher doses).

3.5 Headaches

A. Migraine-like

1. *Verbena officinalis* (vervain) tincture, ¼–1 teaspoon as needed, and/or . . .
2. *Cannabis* spp. or cannabidiol (CBD), variable dosages, and/or . . .
3. *Pueraria lobata* (kudzu), ½ teaspoon 3–4x daily (will also help prevent), and/or . . .
4. *Scutellaria baicalensis* tincture, ½ teaspoon 6x daily (in addition to the core protocol dose), and/or . . .
5. *Piper methysticum* (kava), 10:1 extract, instant powder, in a cup of hot water (with honey and cream), as needed or desired, and/or . . .
6. Lithium orotate, 5–20 mg daily.

B. Headache at the back of the head: *Verbena officinalis* (vervain) tincture, ¼–1 teaspoon as needed.

C. Headache at the front of the head

1. *Silybum marianum* (milk thistle) seed, standardized, 1,200 mg every 3 hours, and/or . . .
2. *Rumex crispus* (yellow dock) root tincture, 1 teaspoon in water at bedtime.

4.0 Cardiovascular System

A. Cardiomyopathy, general: *Crataegus oxyacantha* (hawthorn), 120–900 mg 3x daily.

B. Blood clotting (thick blood): Lumbrokinase, 600,000 IU (a.k.a. 40 mg) 2–3x daily. (Note: Nattokinase will also work, but serrapeptase is too weak. If you are already taking anticoagulants, caution is warranted in adding either lumbrokinase or nattokinase.)

C. Elevated heart rate (hypertension/tachycardia)

1. Specific: *Uncaria rhynchophylla* tincture, ½ teaspoon up to 6x daily.
2. *Crataegus oxyacantha* (hawthorn), 120–900 mg 3x daily, and/or . . .

3. *Leonurus cardiaca* (motherwort), 30 drops–1 teaspoon up to 6x daily, and/or . . .
4. *Mimosa pudica* tincture, 20–60 drops daily. (Note: May also be of benefit if accompanied by depression, anxiety, headaches, and damaged nervous structures.)

D. Low pulse rate (hypotension)

1. *Glycyrrhiza* spp. (licorice) root tincture, 1 teaspoon up to 6x daily depending on the severity of the condition (note: do not take for more than 60 days in this form), and/or . . .
2. Caffeine, variable dosing (try rocket juice chai: a strong infusion of 2 heaping tablespoons black tea chai, 1 heaping tablespoon yaupon, 1 heaping tablespoon yerba mate, 1 heaping tablespoon kola nut, 1 heaping tablespoon guarana, all in a French press, let steep 1 hour, add honey and heavy cream to taste), or . . .
3. If nothing else works, try yohimbine as a supplement. Begin with the dosing recommendations on the product label and increase as needed. (Please note the warnings on the label and use caution.)

E. Palpitations (specific and immediate options)

1. *Scutellaria lateriflora*, 20–60 drops as needed or desired.
2. *Passiflora incarnata*, ½ –1½ teaspoons as needed or desired.
3. *Piper methysticum* (kava), 10:1 extract, instant powder, in a cup of hot water (with honey and cream), as needed or desired.

F. Angina

1. *Terminalia arjuna* (a.k.a. arjuna), 500 mg 3x daily.
2. Hartone capsules (an Ayurvedic remedy from Swadeshi Pharmaceuticals), 1–2 capsules 3x daily.
3. *Ammi visnaga* (khella), 250–300 mg daily, and/or . . .
4. L-carnitine, 500 mg 3x daily, and/or . . .
5. *Crataegus oxyacantha* (hawthorn), 120–900 mg 3x daily, and/or . . .
6. *Salvia miltiorrhiza* tincture, ½ teaspoon 3–6x daily, and/or . . .
7. *Astragalus membranaceus*, 1,000–4,000 mg 3–4x daily.

G. Myocarditis

1. *Mangifera indica*, standardized to 60 percent mangiferin, 1,000 mg 3x daily (Green Dragon Botanicals brand: https://greendragonbotanicals.com), plus . . .

2. *Crataegus oxyacantha* (hawthorn), 120–900 mg 3x daily, and . . .
3. *Astragalus membranaceus*, 1,000 mg 3x daily.

H. Cardiac fibrosis

1. *Terminalia arjuna* (a.k.a. arjuna), 500 mg 3x daily.
2. *Curcuma longa* (turmeric), 750 mg 3x daily.
3. *Polygonum cuspidatum* (Japanese knotweed) root tincture, 1 teaspoon 3x daily.
4. *Salvia miltiorrhiza* tincture, 1 teaspoon 3x daily.

I. Arrhythmia

1. *Stephania tetrandra* or *S. cepharantha* tincture, ½ teaspoon 3x daily, and/or . . .
2. *Crataegus oxyacantha* (hawthorn), 120–900 mg 3x daily, and/or . . .
3. Taurine, 125–375 mg 3x daily, and/or . . .
4. *Leonurus cardiaca* (motherwort) fresh plant tincture, ¼ teaspoon 4x daily.

J. Shortness of breath

1. *Polygonum cuspidatum* (Japanese knotweed) root tincture, ½ teaspoon 3–6x daily, and/or . . .
2. *Astragalus membranaceus*, 1,000–4,000 mg 3–4x daily, and/or . . .
3. Liquid chlorophyll, 1 tablespoon in 20 ounces of water once a day, and/or . . .
4. *Cordyceps* spp. powder, 1 teaspoon–1 tablespoon 3x daily, and/or . . .
5. *Ailanthus altissima* tincture, 10 drops–½ teaspoon 4x daily.

K. Poor circulation (cold extremities): Fresh ginger juice tea (see page 39), 3–4 cups daily.

5.0 Gastrointestinal Tract

A. Loss of taste: See 2.1, section D (page 113).

B. Loss of appetite: *Cannabis* spp.

C. Nausea

1. Homeopathic Nux vomica 30C, 4 pellets every hour, and/or . . .
2. *Mentha piperita* (peppermint) essential oil, 1 drop only, on the tongue, followed by 6 ounces of water.
3. *Moringa oleifera*, 1 teaspoon powder in water 3x daily.

D. Vomiting: Homeopathic Arsenicum album 200C, immediately, at the first feeling of possible vomiting, as directed on the product label.

E. Cramping

1. *Viburnum* spp. (cramp bark), 30–90 drops up to 4x daily.
2. *Pulsatilla patens* (pasque flower), 10 drops as needed, usually no more often than once per hour.

F. Diarrhea

1. Blackberry root, as a strong infusion: ¼–1 ounce herb in 1 quart of hot water, cover and steep overnight, strain, and drink throughout the day. Or prepare the root as a decoction (see page 108) for acute episodes. Note: Do *not* use blackberry tea bags and do not substitute raspberry (unless you must). Oak has minimal effectiveness. Blackberry root is the way to go. It is rare to find any herbal company selling it; try Etsy, it is always there.
2. *Ailanthus altissima* tincture, 1 teaspoon 3x daily or as needed.

G. Gastric reflux (ranging from lower esophageal burning to heartburn to GERD)

1. For lower esophageal burning: *Heracleum maximum* (cow parsnip) seed tincture, 1–2 drops. Use at the onset of burning, as needed. Note: This is a *very* strong, resinous tincture that is also excellent for hiatus hernia.
2. For mild to moderate GERD, as well as lower esophageal burning:
   a. Iberogast (an over-the-counter herbal formulation; you can find it by searching online), as directed on the product label.
   b. Wu Zhu Yu Tang (sometimes called Evodia Formula), as a liquid, as directed on the product label. (Note: Evodia Formula can be made by combining 2 parts ginger root, 1 part evodia fruit, 1 part Asian ginseng root, and ½ part jujube.)
3. For severe GERD: Sini Zuojin combination formula as a decoction or powder. This traditional Chinese formula combines Sini powder extract and Zuojin pill as a treatment for severe GERD.

H. Leaky gut

1. *Salvia miltiorrhiza* tincture, 1 teaspoon 3x daily.
2. *Althaea officinalis* (marshmallow) root powder, 1 teaspoon–1 tablespoon in liquid 3x daily.

3. Turmeric milk, 3x daily.
4. Glutamine, 500 mg 2x daily.

I. Ulceration/damage to bowel wall and epithelia

1. Fresh juice formula: 1 wedge of green cabbage the size of a medium carrot (the core of the protocol—lowers inflammation, heals ulceration/mucosa), 3–4 fresh plantain (*Plantago* spp.) leaves (if you can find them—look in the yard, the plant really does help heal the mucosa and lower inflammation), 1 medium beet, 4 stalks celery, 3 carrots. Drink the blend twice daily, in the morning and just before bed.
2. The chronic fatigue formula (see 1.1, page 110) will help heal the bowel wall as well as lower bowel inflammation and help normalize cytokines.
3. Although most herbalists no longer recommend it, I still use and am a fan of comfrey root powder for healing bowel ulceration, mucosa, and inflammation. I add 1 tablespoon to the chronic fatigue formula (see 1.1, page 110), or else I simply make up a separate blend of 1 tablespoon comfrey root powder, 1 tablespoon licorice root powder, and 1 tablespoon marshmallow root powder. Limit the intake to 30 days.

6.0 Liver, Elevated Enzymes/Inflammation

A. General: *Silybum marianum* (milk thistle) seed, standardized, 1,200 mg 3x daily.

B. Liver pain, just under rib cage

1. *Salvia miltiorrhiza* tincture, 1 teaspoon 3x daily, and/or . . .
2. *Ceanothus* spp. (red root) tincture, ¼–1 teaspoon 3x daily, and/or . . .
3. *Schisandra chinensis* tincture, ¼–½ teaspoon 3x daily.

Concerns about Comfrey

The reason most people are skittish about comfrey is due to concerns about the pyrrolizidine alkaloids (PAs) in the plant. I don't consider PAs a problem for short-term use and have never seen negative impacts from them in 35 years of practice when used short term. But if you have concerns about PA impacts on the liver, take comfrey with standardized milk thistle seed (1,200 mg three times daily). I have never found anything better for healing damage to the intestinal tract, even in cases where surgeons were prepared to remove large sections of the stomach or bowel due to ulceration.

C. Fibrosis in organs: See 13.0 (page 133).

D. Cholangiopathy (i.e., primary sclerosing cholangitis, bile duct damage)

1. *Silybum marianum* (milk thistle) seed, standardized, 1,200 mg 3x daily.
2. *Salvia miltiorrhiza* tincture, 1 teaspoon 3x daily.
3. *Curcuma longa* (turmeric), 750 mg 3x daily.

E. Hepatitis (inflammation of liver): *Silybum marianum* (milk thistle) seed, standardized, 1,200 mg 3x daily.

7.0 Fever

A. General

1. *Eupatorium perfoliatum* (boneset), as a hot tea, as often as needed.
2. *Sambucus* spp. (elder) flower, as a hot tea, as often as needed.
3. *Mentha piperita* (peppermint), as a hot tea, as often as needed.
4. *Corallorhiza maculata* (coral root), or equivalent species, tincture, 30 drops (full dropper) each hour depending on the severity, and/or . . .
5. *Achillea millefolium* (yarrow), as a hot tea, as often as needed, or as a tincture, 10–30 drops as often as needed.
6. *Cryptolepis sanguinolenta* tincture, ½–1 teaspoon 3–4x daily.

B. If severe, add:

1. Wash with cool cloth or soak in tub until fever lowers, and/or . . .
2. Dosages of the above herbs may be increased if the fever is very severe.

C. For relapsing/recurrent fever (shaking chills/alternating sweats): *Eupatorium perfoliatum* (boneset) tea, 3–6 cups daily.

D. For temperature fluctuations in the body: serrapeptase, 120,000 SPU 3x daily.

8.0 Eye Problems

A. Specific for infected conjunctiva: *Isatis* spp. infusion eyewash (prepared as with nettles; see page 132), 1–2 drops in each eye 3x daily. Keep the infusion refrigerated; it will last a week. (If necessary you can also prepare isatis as a decoction for a stronger antiviral effect.)

B. Supportive (and for blurry vision)

1. Vitamin C, 1,000 mg, 3x daily, and . . .
2. Zinc, 25–50 mg once daily, and . . .
3. Lutein, 50 mg 3x daily, and . . .
4. Bilberry (*Vaccinium myrtillus*), 500 mg 2x daily.

C. Floaters

1. *Stephania tetrandra* tincture, ½ teaspoon 3x daily, and/or . . .
2. Chlorella, 1 tablespoon 3x daily, and/or . . .
3. Zeolite, 15 drops liquid 3–4x daily, or 2 heaping teaspoons powder daily, or 3 capsules daily.

D. Photosensitivity

1. Melatonin, 3–9 mg daily, and . . .
2. *Leonurus cardiaca* (motherwort) tincture, ½–1 teaspoon 3–6x daily, and/or . . .
3. *Hericium erinaceus* (lion's mane) tincture, ¼–½ teaspoon 3x daily, and/or . . .
4. Lichi berries, eaten throughout the day.

9.0 Pain

A. General

1. Pea protein, one scoop every 8 hours (I use the Jarrow Formulas brand), and/or . . .
2. Homeopathic Bryonia 30C 4 pellets 4x daily, and/or. . .
3. Homeopathic Arnica 30C, 4 pellets 4x daily, and/or . . .
4. Homeopathic Hypericum, 4 pellets 4x daily, and/or . . .
5. *Corydalis* spp. tincture, ⅛–¼ teaspoon 3–4x daily (contraindicated in liver disease), and/or . . .
6. *Monotropa uniflora* (Indian pipe) tincture, ¼–½ teaspoon hourly or as needed, and/or . . .
7. *Corallorhiza maculata* (coral root), or equivalent species, tincture, ½–1 teaspoon up to 6x daily, and/or . . .
8. *Verbena officinalis* (vervain) tincture, ¼–1 teaspoon as needed, and/or . . .
9. *Leonurus cardiaca* (motherwort) fresh plant tincture, 1 teaspoon–½ ounce (yes, ounce) in water as needed, and/or . . .

10. *Pedicularis bracteosa* (lousewort) tincture, 1 teaspoon–½ ounce (yes, ounce) in water as needed.

10.0 Muscle Weakness

A. General

1. Combination tincture formula: equal parts of *Pinus* spp. (pine) pollen, *Aralia nudicaulis* (or equivalent species), and *Panax quinquefolius* (American ginseng). Dosage: 30 drops (full dropper) of the tincture formula 3x daily for 6 months (take by mouth, let sit a minute, then swallow; do not dilute in water), and/or . . .
2. L-carnitine, 1,000 mg 3x daily, and/or . . .
3. Taurine, 500–1000 mg 3x daily, and/or . . .
4. Homeopathic Lycopodium 30C, 4 pellets 4x daily.

11.0 Swollen Lymph Nodes/Sluggish Lymph

A. General

1. *Salvia miltiorrhiza* tincture, 1 teaspoon 3x daily, and/or . . .
2. *Phytolacca americana* (poke) root tincture, 5–10 drops 2x daily, and/or . . .
3. *Galium aparine* (cleavers) tincture (especially for nodules and cysts), ½ teaspoon 3x daily.

12.0 Kidneys

A. To repair or inhibit further damage: *Urtica dioica* (nettles). Make 1 quart of nettle infusion (see below) and drink throughout the day, every day. As well, take ¼ teaspoon nettle seed tincture 3x daily, every day.

Nettle Infusion

To make:

Add 1–2 ounces of dried nettle leaf to a quart mason jar. Fill the jar with hot water, let steep overnight, strain, and drink throughout the next day. (Some people think the herb can be used again at least once more.) Note: For years I was curmudgeonly in response to (i.e., highly suspicious of) occasional claims I heard about nettles being able to heal kidney

damage. However, my partner Julie McIntyre has been suggesting it in practice for some time and has reported significant healing of damaged kidneys, in one instance so much so that dialysis was avoided. I rather shamefacedly stand corrected.

B. Frequent urination

1. *Verbascum thapsus* root tincture, 10–30 drops up to 6x daily. Will help restore bladder tone over time. Best, in this instance, if used with an endothelial normalizer and protectant such as *Salvia miltiorrhiza* or *Polygonum cuspidatum* tincture daily.
2. Ba Wei Di Huang Wan (TCM formulation), as directed on the product label (try Acupuncture Atlanta as a source).
3. Caprylic acid, taken as directed on the product label.

C. Proteinuria: Combination tincture formula of equal parts of *Salvia miltiorrhiza, Astragalus membranaceus,* and *Angelica sinensis*. Dosage: 1 teaspoon 3x daily.

D. Hematuria: same as section C above.

E. Elevated serum creatine: Avarai kudineer (an Ayurvedic blend; you can find it by searching online). Put 100 grams in 30 ounces of water, bring to a boil, reduce to a simmer, and simmer until reduced by two-thirds (note: boiling down is not a perfect calculation; all of us guess). Let cool, then press the liquid out of the herbs and refrigerate. Dosage: 1 tablespoon 3x daily until gone (approximately 10 days).

F. Elevated urea nitrogen: same as section E above.

G. Extreme thirst: Ba Wei Di Huang Wan (TCM formulation), as directed on the product label (try Acupuncture Atlanta as a source).

H. Fibrosis: see 13.0 below.

13.0 Fibrosis in Organs

A. To inhibit, reduce, or repair fibrosis in organs: Combination tincture formula of equal parts of *Angelica sinensis, Salvia miltiorrhiza, Lonicera japonica, Polygonum cuspidatum, Cordyceps* spp. Dosage: 1 teaspoon 3–6x daily depending on severity of fibrosis.

14.0 Reproductive System

A. Male

1. Hypogonadism (low testosterone)
   a. Pine pollen tincture, ¼ teaspoon held on the tongue for 1 minute, then swallowed, at least 3x daily.
   b. *Eurycoma longifolia* (tongkat ali) capsules, 1,000 mg daily.
2. Low libido: Pine pollen tincture, as above.
3. Erection problems
   a. Pine pollen tincture, as above.
   b. *Eurycoma longifolia* capsules, as above.
4. Orchitis: Long Dan Xie Gan Tang (TCM formulation), taken as directed on the product label.
5. Infertility: Combination protocol of the following:
   a. *Cornus officinalis* (Chinese dogwood) tea, daily.
   b. *Tribulus terrestris*, 250 mg, 3x daily.
   c. Speman (a traditional Ayurvedic formulation), 2 tablets 3x daily for 3 months.
   d. L-carnitine, 500–1,000 mg daily.
   e. L-arginine, 500–3,000 mg daily.
   f. Zinc, 25 mg daily.

B. Female

1. Severe cramping
   a. *Viburnum opulus* or *V. prunifolium* (cramp bark, black haw) tincture,½–1 teaspoon 6x daily.
   b. *Actaea racemosa* (a.k.a. *Cimifuga racemosa*, black cohosh), 30–40 drops of the tincture up to 2x daily or 300–1,000 mg daily.
   c. *Zingiber officinale* (ginger) capsules, 1,500 mg daily.
   d. *Leonurus cardiaca* (motherwort) tincture, ¼–1 teaspoon as needed.
   e. *Vitex agnus-castus* (chasteberry), 400–1,000 mg or 60–120 drops of the tincture daily. A tonic; builds in effectiveness over several months.

2. Menstrual irregularity
   a. *Vitex agnus-castus* (chasteberry), 400–1,000 mg or 60–120 drops of the tincture daily.
   b. *Alchemilla vulgaris* (lady's mantle) tincture, ½–1 teaspoon 3x daily.
   c. *Angelica sinensis* (dong quai), 500–1,500 mg 3x daily or ¼–½ teaspoon of the tincture 3x daily.
3. Infertility: *Vitex agnus-castus* (chasteberry), 400–1,000 mg or 60–120 drops of the tincture daily.

15.0 Musculoskeletal Problems

A. Myalgia (muscle pain)

1. Pea protein, one scoop every 8 hours or as needed. (Note: I use the Jarrow Formulas brand.)
2. *Piper methysticum* (kava) 10:1 extract, instant powder, in a cup of hot water (with honey and cream), as needed or desired.
3. Cannabidiol (CBD) or *Cannabis* spp., as needed.

B. Arthralgia (joint pain)

1. *Boswellia carteri*, 1,000 mg 2x daily, or in acute cases, 2–3x daily. I prefer the Superior Labs formulation (which you can find by searching online), which contains 500 mg boswellia, 100 mg L-leucine, and 7.5 mg of a piperine extract. The essential oil of boswellia (frankincense) applied topically may also help.
2. Bromelain, 500 mg daily or, in acute cases, 3x daily. I prefer the Toniiq brand (again, you can find it online).
3. *Piper methysticum* (kava) 10:1 extract, instant powder, in a cup of hot water (with honey and cream), as needed or desired.
4. Cannabidiol (CBD) or *Cannabis* spp., as needed.

C. Tremors and shaking: see 3.0, section G (page 120).

16.0 Skin Problems

A. Dry skin

1. Increase intake of fats and oils, specifically avocado, olive oil, coconut oil.
2. Nettle leaf tea, daily, in quantity.
3. Burdock root tea, daily, in quantity. Or capsules, 900 mg 3x daily.

B. Rash

1. General:
   a. *Galium aparine* (cleavers) tea, daily, in quantity. Or fresh plant tincture, ½–1 teaspoon 3–6x daily.
   b. Any of the following homeopathics can help, sometimes very much so: Apis, Hepar sulphur (Hep), Caladium (especially in asthma or lung disease), Histaminum, Arsenicum. All 30C, taken as directed on the bottle.
2. With itching: homeopathic Sulphur or homeopathic Psorinum, both 30C.

C. Easy bruising: Endothelium-protective and regenerative herbs will help (*Polygonum cuspidatum* and *Salvia miltiorrhiza*, especially), but also:

1. Hesperidin, 100 mg 2x daily.
2. Rutin, 50–100 mg 2x daily.
3. Diosmin, 900 mg daily.
4. Pycnogenol, taken as directed on the product label.

D. Extreme skin sensitivity

1. *Leonurus cardiaca* (motherwort) tincture, 1 teaspoon 3–6x daily, and/or . . .
2. *Corallorhiza maculata* (coral root), or equivalent species, tincture, ½–1 teaspoon up to 6x daily, and/or . . .
3. *Pulsatilla patens* (pasque flower) tincture, 10 drops as needed, usually no more often than once per hour, and/or . . .
4. *Gastrodia elata* tincture, ¼–½ teaspoon 3–6x daily, and/or . . .
5. *Piper methysticum* (kava) 10:1 extract, instant powder, in a cup of hot water (with honey and cream), as needed or desired.

E. Hair loss

1. Nettle leaf tea, in quantity, daily.
2. Pea protein powder, taken as directed on the product label. (Note: I use the Jarrow Formulas brand.)
3. Nutritional yeast (*not* enriched or fortified), 1 tablespoon daily.

17.0 To Lower Histamines/Stabilize Mast Cells

A. General

1. *Petasites hybridus* (butterbur), 50 mg 3x daily, and/or . . .
2. Inositol, 600 mg 2x daily.

B. Specific: *Stachys palustris* (marsh woundwort) tincture, 1 teaspoon 3x daily; excellent but hard to get.

C. NasalCrom inhaler, as needed.

18.0 Generalized inflammation and pain

A. General: Low-dose naltrexone (LDN). Note: Many integrative physicians are using LDN for the treatment of chronic fatigue syndrome with accompanying myalgia and systemic inflammation. It does seem to work well for some people. I order mine from China; some very good supply companies can be found online. It is best, I think, to begin with 1 mg capsules for several weeks, then go to 2.5 mg for a few weeks, then to 4 mg. You can find more information on patient experiences online.

19.0 Postural orthostatic tachycardia syndrome (POTS)

A. General

1. *Leonurus cardiaca* (motherwort), ½–1 teaspoon up to 6x daily.
2. Micronized purified flavonoid fraction (MPFF), 500 mg, 1–3x daily.
3. Diosmin/hesperidin blends, taken as directed on the product label.
4. *Polygonum cuspidatum* (Japanese knotweed) root tincture, ½ teaspoon up to 6x daily.
5. *Scutellaria lateriflora* leaf tincture, ½–1 teaspoon up to 6x daily.
6. Low-dose naltrexone (see 18.0 above). Best if started low and then increased: 1 mg for 2 weeks, 2.5 mg for 2 weeks, then 4 mg.

20.0 Dysautonomia

A. Adaptogenic herbs

1. *Eleutherococcus senticosus* tincture, in a 1:5 formulation (not the stronger 1:1 or 2:1), ½–1 teaspoon 3–6x daily, or capsules, taken as directed on the product label.
2. *Rhodiola* spp. tincture, ½ teaspoon 3x daily (may cause dizziness at higher doses).
3. *Schisandra chinensis* tincture, ½ teaspoon 3–6x daily, or capsules, taken as directed on the product label.
4. *Withania somnifera* (ashwagandha) tincture, ½–1 teaspoon 2x daily, or capsules, taken as directed on the product label. May cause drowsiness; best taken in the late afternoon and at night before bed.

21.0 Thermoregulation dysfunction

A. General: Microdosed psilocybin.

B. Specific: Serrapeptase, 120,000 SPU 3x daily.

C. Female: *Vitex agnus-castus* (chasteberry), 400–1,000 mg daily, or 60–120 drops of tincture daily. A tonic; builds in effectiveness over several months.

Final Comment: Breathing Exercises

Retraining your breathing pattern can reduce many of the symptoms of post-coronavirus syndrome. After Covid-19 damage to the lungs, deep belly breathing has been found to substantially increase oxygen levels. (Despite medical practitioners now taking credit for this in the treatment of long haulers, many psychotherapeutic and bodywork disciplines in the United States developed belly breathing for use in their practices for the treatment of a wide range of conditions in the 1970s; yoga and qigong practitioners did so in the East centuries earlier.) As earlier practitioners realized, this also helps reduce or reverse fatigue, shortness of breath, lymphatic problems, tachycardia, dizziness, anxiety, and brain fog.

To begin, you need to understand the difference between chest and belly breathing. Lie down and place your hand on your belly. Breathe in and out, slowly and deeply, until you feel your hand rise up and down with your breath. When you breathe into your chest only, the belly does not move. Especially if you are severely fatigued, start doing this lying down. After a while, do it sitting up. Then practice it standing, then walking.

Every morning: Inhale through the nose for four counts, exhale through your nose for six. Do this five to ten times.

Every evening: Inhale for four counts, hold for four, exhale for four. Do this five to ten times. (You can increase the number of times you do it as you gain experience.)

Note: If you cannot do these breathing exercises five to ten times, just do them as many times as you can. Don't push yourself. You are just retraining your body's breathing patterns. Some people find that inhaling for a two count, then breathing out through pursed lips for a four count works better for them. The point is to train your body to engage in belly (a.k.a. diaphragmatic) breathing as a normal behavior.