SARS-CoV2 Spike protein Injury from infection or inoculation: Prevention and Management with Metabolic Correction Approach

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Resumen

El COVID-19 ha causado un gran impacto en la salud y la economía mundialmente. Además de las mascarillas, la higiene y la distancia física, la principal estrategia empleada por los gobiernos para abordar la crisis ha sido la inmunización masificada mediante la aplicación de una tecnología nunca antes aprobada por las agencias regulatorias para ser utilizada en seres humanos. Para la inoculación, una tecnología de mRNA que no había sido utilizada anteriormente, fue implementada rápidamente para producir lo que posteriormente fueron las vacunas experimentales. Los gobiernos alrededor del mundo proveyeron autorizaciones de emergencia para ser administradas a la población con un sentido de urgencia. Los sistemas de recolección de datos oficiales relacionados a la post-inoculación reportaron que los efectos adversos o lesiones más comunes fueron inflamación, coagulopatías y disfunción mitocondrial, entre otros (Klein, 2021). Desafortunadamente, la mayoría de los

Abstract

COVID-19 caused great health and economic impact worldwide. Besides face masks, hygiene, and physical distancing, the main strategy of governments to address the crisis was mass immunization through the application of a technology never approved by regulatory agencies to be used on humans before. For the inoculation, an mRNA technology never used before was quickly implemented to produce what were then experimental vaccines. Governments around the world provided emergency authorization to be administrated to the population with a sense of urgency. The official data collection systems related to post-inoculation reported that the most common adverse effects or injuries were inflammation, coagulopathies, and mitochondrial dysfunction, among others (Klein, 2021). Unfortunately, most governments, universities and professional organizations neglected to educate and emphasize on the important contribution of we summarize some of the pathophysiological mechanisms related to

gobiernos, universidades y organizaciones profesionales no educaron y tampoco enfatizaron sobre la importancia de la contribución de estilos de vida saludables (nutrición, suplementación, ejercicio, descanso y balance autonómico) en la optimización del sistema inmune y la salud. En este artículo se resumen algunos de los mecanismos patofisiológicos relacionados a las lesiones post-vacunación (efectos adversos) y proponer opciones restaurativas ortomoleculares para reestablecer el funcionamiento normal y reducir las complicaciones.

Palabras clave: SARS-CoV2 Spike protein, Corrección Metabólica, mRNA

healthy lifestyle habits (nutrition, supplementation, exercise, rest, and autonomic balance) on the optimization of the immune system and health. In this article post-vaccine injuries (adverse effects) and propose orthomolecular restorative options to reestablish normal function and reduce associated complications.

Keywords: SARS-CoV2 Spike protein, Metabolic Correction, mRNA

Background

Since the emergence of the COVID-19 pandemic, vaccination has been the predominant strategy established by many government health authorities around the world (CDC Strategy for Global Response to COVID-19, The White House COVID-19 Plan, WHO COVID-19 Vaccines). In the US, the use of new technology intended to provide immunization against SARS-Cov2 virus infection has been given an emergency use authorization and despite numerous ongoing studies, there is a lack of information on its long-term effects.

Reports of adverse events following COVID-19 vaccination (including allergic reactions) are closely monitored by national authorities and international bodies (e.g., WHO) for the early detection of serious side effects. Consequently, this pandemic response has surged emerging data points to a variety of observed, documented, and reported post-vaccine adverse events (AE) or injuries. There are a number of fatalities that are attributable to adverse effects of the COVID-19 vaccines including vaccine-induced immune thrombotic thrombocytopenia (VITT) (Schneider et al. 2021) myocarditis and others (Maiese, 2022).

A study evaluated the Long-term outcome of patients with vaccine-induced immune thrombotic thrombocytopenia and cerebral venous sinus thrombosis reported that 30% had a good recovery, 25% had a moderate disability, 14% had a severe disability and 32% had a fatal outcome (Kehr et al. 2021). Non-fatal vaccine-induced injuries also include thrombotic thrombocytopenia (Sharifian-Dorche et al. 2021), acute transverse myelitis (ATM) (Roman et al. 2021), Myocarditis (Patone et al. 2022), and others. The purpose of this article is to present a dietary and nutraceutical protocol to restore normal physiological functions that may be altered as a result of these inoculations. The implementation of this protocol is intended to help prevent or reduce associated complications, though it is not intended to be perceived as a substitute for professional medical advice, diagnosis, or treatment.

Covid-19 is an infectious disease caused by the SARS-CoV-2 virus (Zhu, 2019). To date, it is the most challenging pandemic of the 21st century. In the United States, there are currently four vaccine-like products either authorized for emergency use (EUA) or fully approved (e.g., Pfizer-BioNTech COVID-19 Vaccine, marketed as Comirnaty) by the US Food and Drug Administration (FDA) that are being administered in various initial series and booster doses (Rosemblum, 2021).

According to the CDC, a total of 608,937,334 million doses have been administered by August 2022 (CDC, 2022). Any product, especially drugs or vaccines widely utilized will produce certain adverse effects on some individuals, and it is important to know about these so they can be identified, documented, and reported. This will help prevent, minimize, or resolve these reported ongoing adverse events. We should be cognizant that all possible side effects of a drug cannot be anticipated based on preapproval studies, all new drugs need proper post-marketing surveillance. In addition, FDA specifically recommends long-term follow-up studies to document data on delayed adverse events following the administration of genomic therapy (GT) products (FDA Long Term Follow-up on Gene

Therapy Products). Therefore, it is advisable to anticipate and recognize risk factors and early signals to reduce and mitigate any possible harm.

For the purpose of this discussion, we will briefly summarize the literature on the toxicity of the spike protein and then focus on preventive interventions, or an early intervention protocol to protect from possible reactions following exposure to the virus or the administration of these experimental vaccines. Protocols can also be established to screen and be able to detect possible, undesired health changes or negative reactions during the early post-vaccination period, after each dose (14-21 days) and boosters (14 to 90 days). This orthomolecular protocol will help the patient relieve inflammation, maintain proper physiologic homeostasis, and promote cellular energy.

This is a general guide to alert and address the main harmful effects in people who experience symptomatic and asymptomatic adverse events after a sudden elevation of S-protein produced by the viral infection or after receiving an injection of the EUA and COVID-19 vaccines. Further harmful effects may be mediated by additional mechanisms and, therefore, a careful evaluation must be conducted to identify causes and approaches that will help resolve specific needs in some patients.

Vaccine design, mechanisms and potential problems

Customarily vaccines contain an attenuated or inert microorganism that also includes many of its protein components, adjuvants that induce inflammation to enhance the immune response, and preservatives to maintain stability and prevent the growth of potential pathogens.

However, currently available SARS-CoV2 vaccines are different because they are based on messenger ribonucleic acid (mRNA) either encapsulated in a synthetic nanoparticle or in a biological adenovirus vector (carrier). Instead of containing the whole set of antigenic viral proteins, it contains the mRNA with the instruction to create only the spike protein (Gu, 2020; Lamb, 2021). A waning immunity has been observed to occur in as little as 14 days in some age groups to six months with the BNT162b2 or ChAdOx1-S vaccine prompting recommendations to give boosters (Goldberg et al. 2021; Levin et al. 2021; Andrews et al. 2022). The waning of immunity from the COVID-19 mRNA vaccine is not surprising for two reasons, it is based on producing antibodies against a single protein, and, since coronaviruses are RNA viruses, their genome is less stable and more prone to mutations (Laha, 2020).

Unlike conventional vaccines, there is no set amount of protein administered in mRNA products but an age-adjusted mRNA dose instead (e.g., Pfizer-BioNTech vaccine single dose is 30 µg intramuscularly, whereas Moderna vaccine dose is 100 µg intramuscular). Upon injection of the mRNA nanoparticle product into the deltoid muscle, local inflammation is produced to enhance the entry of the mRNA into a variety of cells. After the coupling of the vaccine mRNA with the ribosome, the transcription process starts building the amino acid chain of the spike (S) protein. The rate of S protein synthesis and the total amount produced will vary from one individual to another. The

S protein from the SARS-CoV2 virus has been shown to be responsible for inducing a number of pathogenic processes. Therefore, in theory, upon administration of the vaccine, those individuals that produce higher amounts of S protein at a faster rate than they can produce neutralizing antibodies may be at risk of developing adverse effects from the S protein excess. Also, the number and location of S protein receptors are also of relevance in the outcome of either adverse events to the vaccine or to the virus.

After vaccination, circulating S protein originates from endogenous production, and its concentration is expected to be higher in tissues where production occurs. These kinetics/dynamics should be investigated for potentially toxic concentrations in tissues and organs where S protein is produced. To this effect a woman with mRNA-1273 COVID-19 vaccine-induced thrombocytopenia, had plasma S protein levels 10 days after vaccination were 10 ng/ml, which was about 100 times higher than reported by Ogata and colleagues in vaccinated subjects with no evident adverse effects (Ogata et al. 2022). Therefore this suggest that excessive vaccine-induced production of S protein, produce high concentrations to produce significant binding of targets such as ACE2, resulting in vaccine toxicity.

A study examined the EudraVigilance European database in vaccine recipients up to 23 June 2021 and related them to coagulation disorders and arterial, cardiac, and nervous system events (Cari, 2021). However, most of these reports are rather related to Vaxzevria (previously known as ChAdOx1 nCoV-19 [ChA] vaccine by AstraZeneca) and Jcovden (previously known as Ad26.COV2-S [AD26 recombinant] vaccine by Janssen), but not to the Moderna or Pfizer-BioNTech vaccines. Furthermore, we cannot rule out the possible effect of COVID-19 disease on these events as some vaccinated individuals may become infected during the documented period. The frequency of serious adverse events (SAEs) and SAE-related deaths was compared between ChA and AD26 versus BNT162b2 COVID-19 (BNT by Pfizer/BioNTech) vaccine recipients. The analysis demonstrated that ChA and AD26 recipients had higher frequencies of not only SAEs caused by venous blood clots and hemorrhage, but also thromboembolic disease, arterial events, including myocardial infarction and stroke, and a higher frequency of SAE-related deaths than BNT recipients (Cari, 2021).

Since mRNA vaccines wane immunity so quickly, the FDA has approved in a short time multiple doses of boosters with the idea of achieving some level of immunity. Multiple doses of mRNA might imply multiple possibilities of adverse effects and injuries from the vaccine; in addition to the potential risk for rare immune derangements such as immune exhaustion and antibody Dependent Enhancement (ADE). This ADE (FcRn-mediated) phenomenon has been demonstrated with the Dengue virus (Langerajk, 2019). ADE of Omicron variant infection has been observed in some sera. (Shimizu, 2022).

There are several ingredients in the vaccine and any of them could in theory have the potential for producing adverse effects. However, the most likely cause of the toxicity can be attributed to the spike protein. For more detailed information on this topic refer to the consensus paper on

SARS-Cov2, the immune system, and COVID by Gonzalez et al. (2022).

Serious adverse effects associated with covid vaccines include acute myocardial infarction, Bell's palsy, cerebral venous sinus thrombosis, Guillain–Barré syndrome, myocarditis/pericarditis (mostly in younger ages), pulmonary embolism, stroke, thrombosis with thrombocytopenia syndrome, lymphadenopathy, appendicitis, herpes zoster reactivation, neurological complications, acute kidney injury and autoimmunity (Barda et al. 2021; García-Grimshawet al. 2021; Luo et al. 2022).

One of the autoimmune complications that has been reported after the COVID vaccines is Multiple Sclerosis (MS). MS is characterized by persistent inflammation, gliosis, demyelination, and neuronal loss. A few days after receiving the COVID vaccine a 32-year-old patient presented with symptoms of MS and laboratory and imaging findings confirmed the diagnosis (Tagliaferri et al. 2021). Three other cases of new-onset or reactivation of demyelinating disease were reported after vaccination with Oxford-AstraZeneca COVID-19 recombinant vaccine (Voysey et al. 2021). The concern about increased relapse rates of MS after vaccination was addressed in a report examining 500 MS patients was evaluated in a way that established comparable (approximately 2%) relapse rates in a similar time period without vaccination (Achiron et al. 2021). Later, a neurology group from Cleveland, Ohio (USA) reported a series of 5 cases of newly diagnosed MS following mRNA COVID-19 vaccines. Four of the patients responded to high dose steroid, and one requiring plasmapheresis (Toljan et al. 2022). A systematic review of seven studies evaluated 29 cases of relapse after COVID-19 vaccination in MS patients. The average time between covid-19 vaccination and relapse symptoms was 9.5 days, Relapse appeared after the first dose in 22 cases, 1 after the second dose and 5 after the booster dose. Most of the symptoms were sensory deficits and weakness (Nabizadeh et al. 2022). Since both the infection and the vaccine can trigger MS relapse, it is of upmost importance to maximize all lifestyle factors and dietary supplements that will protect the patient's individual health and keep close monitoring.

There are also reports of pathological involvement of placenta in COVID-19 (Motwani et al. 2022).[i] In a retrospective study for intrauterine maternal-fetal transmission of SARS-CoV-2, the virus was found within intact syncytiotrophoblast in a background of chronic histiocytic intervillositis and necrosis. Syncytiotrophoblasts are a cell type located in the fetal side of the placenta and studies have found that they contain high levels of angiotensin-converting enzyme 2 (ACE2), as well as the protease TMPRSS2 which facilitates infection. Virus presence in these cells was identified through immunohistochemistry for SARS-CoV-2 antigen (spike and nucleocapsid proteins) or RNA in situ hybridization for SARS-CoV-2 nucleic acid (Schwartz et al. 2021). Similar findings were found in other studies of placentitis from fetal and neonatal SARS-CoV-2 death cases (Fitzgerald et al. 2022).

Most complications of SARS-CoV-2 infection have been attributed to the spike protein (Panigrahi et al. 2021) which is also

present in variables and unpredictable amounts and duration. Therefore, careful evaluation of its safety and effectiveness in pregnant women and their fetus need additional research.

Spike (S) protein pathogenicity

It has been proposed that SARS-CoV-2 spike protein can efficiently fuse cells, causing syncytia that serve as a trigger to the coagulation cascade even in tissues that are not infected with the virus. (Lazebnik, 2021; Rosell et al. 2021).

The fusion between neurons and glial cells in humans has been proposed to explain the origin and persistence of the neuropathic pain in herpes zoster (Zerboni et al. 2014). It is still unknown if the S-protein can induce neuron fusion, but a recent report (preprint) suggest that it can cause neuronal and glial fusion. Syncytium produced by cell fusion can produce binuclear or trinuclear cells where mitoses are commonly multipolar and consequently are predisposed to producing aneuploid cells with chromosomal aberrations, with the corresponding abnormal features to resulting cells progeny like cancer (Godinho, Kwon et al. 2009). S protein has also been implicated in mitochondrial dysfunction (Shang et al. 2022), neuropathy (Waheed et al. 2021), and coagulopathies (De Michele et al. 2022); Ostrowski et al. 2021) among other pathogenic outcomes.

Other relevant proteins such as IL6 cytokine, TNF, Furin, and Serine protease may be increased. Elevated systemic interleukin-6 levels in patients with COVID-19 are considered a relevant parameter in predicting the most severe course of the disease. Another key proinflammatory cytokine, TNF, is also released abundantly during cytokine storms, caused by SARS-CoV-2 infection or high quantities of S protein (Gubernatorova et al. 2020). Furin, another protease, hydrolyzes the spike fusion peptide facilitating the entrance of either the virus or the S protein into the cell (Kocyigit et al. 2021). Once the S protein has been cleaved by furin, it is activated by the serine protease (TMPRSS2), this, in turn, stimulates viral pathogenesis and spread; in addition to neutralizing antibodies that may decrease viral recognition (Rahbar Saadat et al. 2021).

The most severe complications that result from a SARS-CoV-2 (COVID-19) viral infection, are likely respiratory, cardiac, cardiovascular, and neurological events, all come from inflammation caused by exaggerated host immune response because of the adhesion of the S-Spike protein to the TLR (Toll-like cell receptors), like the TLR-4 in the cell membrane (Aboudounya and Heads 2021). In theory, this mechanism may also be activated when the body itself is producing S-protein in response to the SARS-Cov2 mRNA vaccines. TLR-4 is a part of the innate response that acts as a pathogen pattern recognition receptor (PRR) and has been found to play a central role in the onset of hyperinflammation and cytokine storms (Olejnik et al 2022). The persistent and unresolved presence of oxidative stress and persistent inflammation can lead to long-term effects on the immune system and is the driving cause of persistent or long COVID-19, and other auto-immune conditions (Vollbracht et al. 2022).

Inflammation

Systemic inflammation has been proposed as one of the reasons for the high mortality seen in COVID-19 patients. Myocarditis has been proposed to account for a fraction of morbidity and mortality. Moreover, following inoculation with mRNA COVID-19 vaccines, myocarditis and pericarditis have been documented to develop within a few days of vaccination, especially following the second dose (Kornowski, 2022).

The S protein from the SARS-CoV-2, but not M, N, and E proteins have been found to be a potent viral pathogen-associated molecular pattern (PAMP), which stimulates macrophages, monocytes, and lung epithelial cells, leading to the stimulation of the NF-κB pathway and production of inflammatory cytokines and chemokines. This article provides critical insight into the molecular mechanism that may contribute to cytokine storms during SARS-CoV-2 infection. S protein potently induced inflammatory cytokines and chemokines, including IL-6, IL-1β, TNFα, CXCL1, CXCL2, and CCL2 (Khan et al. 2021). Others have concluded that the presence of SARS-CoV-2 spike protein in epithelial cells promotes IL-6 signaling to initiate the coordination of a hyper-inflammatory response (Patra et al. 2020). Uncontrolled Inflammation can have different implications depending on the characteristics, location, and persistence of such inflammation. More recently, it was demonstrated that up-regulation in inflammatory cytokines and corresponding lymphocytes with tissue-damaging potential, implies a cytokine-dependent pathology, which can also occur with myeloid cell-associated cardiac fibrosis (Barmada et al. 2023).

In a retrospective study, a group of 15 patients with post-covid-19 vaccine myocarditis (PCVM) the average age was 17.2 years (range 15-19 years) and the mean time from vaccination to onset of symptoms was 4.4 ± 6.7 (median 3, range 0-28) days. All patients had cardiac magnetic resonance imaging CMR post-diagnosis at 4 ± 3 (median 3, range 1-9) weeks, 4/5 patients had hyperenhancement, and 12 pathological Late gadolinium enhancement. Late CMR follow-up demonstrated the resolution of the edema in all patients, while some had evidence of residual myocardial scarring (Amir, 2022).

A study evaluated the risks in younger people after sequential vaccine COVID-19 doses. The incidence rate ratio and excess number of hospital admissions or deaths from myocarditis per million people were estimated for 1 to 28 days after sequential doses of the vaccines. It was found that the risk of vaccine-associated myocarditis is consistently higher in younger men of less than 40 years, particularly after the second dose of the mRNA vaccine. The number of additional hospitalizations or deaths for 28 days was estimated to be 97 per million people exposed (Patone, 2022).

The analysis of the demographic data indicates that adolescent and young adult men are at the highest risk of myocarditis after mRNA vaccination. Also having a longer interval between doses seems to diminish the risks (Pillay, 2022). A recent update found that the incidence of myocarditis vaccines is rare; however, adolescent and

young adult men are at highest risk, especially after the second dose of the vaccine. It is also more common in males than females. Autopsy reports of two microscopic adolescent deaths occurring shortly following administration of the second Pfizer-BioNTech COVID-19 dose revealed that the myocardial injury resembling a catecholamine-mediated stress (toxic) cardiomyopathy (Gill, Tashjian et al. 2022).

Some experts recommend that Pediatricians should consider myocarditis in the differential diagnosis of patients showing with chest pain after receiving COVID and proceed accordingly, including appropriate management and reporting of this possible adverse event (Tano et al. 2021).

Coagulopathies

Inflammation and platelet activation has been implicated as a mechanism behind vaccine-induced thrombosis and thrombocytopenia (Ostrowski et al. 2021).

It has been found that the prevalence of DVT in hospitalized patients with SARS-CoV-2 infection is high and is associated with adverse outcomes (Zhang et al. 2020).[ii] Circulating Von Willebrand factor and high molecular weight multimers are markers of endothelial injury and drive micro-thrombosis; they might predict in-hospital mortality in COVID-19. (Philippe et al. 2021). SARS-CoV-2 spike protein alone without the rest of the viral components is sufficient to elicit cell signaling in lung vascular cells producing a thickening of the pulmonary vascular walls in COVID-19 patients (Suzuki et al. 2020).

Activation of endothelial cells is thought to be the primary driver for thrombotic complications, potentially due to the SARS-CoV-2 Spike protein binding to the angiotensin-converting enzyme 2 (ACE2) (Satta et al. 2021). Some patients have presented apparent secondary immune thrombocytopenia (ITP) after inoculation of Pfizer and Moderna vaccines and it's not currently possible to exclude these products as potential triggers (Lee et al. 2021). However, only 20 cases were detected among the over 20 million people who had received at least one dose of these two vaccines in the United States at the time of this report, representing less than one case in a million vaccinated persons.[29] Moreover, the authors of this report concluded that the incidence of ITP post-SARS-CoV-2 vaccination appears to be coincidental cases.

Because mRNA COVID-19 vaccines are based on the production of S-protein they have the potential to produce thrombotic adverse effects. A variety of factors such as genetic heterogeneity, age, and the presence of comorbidities in the population are thought to be associated with severe adverse outcomes. A study of the SARS-CoV-2 spike protein-induced inflammasome and its interaction with platelets and fibrin/fibrinogen suggest that the presence of spike protein in circulation may contribute to the hypercoagulation in COVID-19 positive patients and may cause substantial impairment of fibrinolysis (Grobbelaar et al. 2021).

A total of 45 cerebral venous thromboses (CVT) cases after SARS-CoV-2 inoculation was reported in Germany. The incidence was higher for ChAdOx1 than for BNT162b2 (Schulz et al. 2021). A population-based cohort study of 46 million adults in England revealed rates of intracranial venous thrombosis (ICVT) and of thrombocytopenia in adults aged <70 years were higher on days 1 to 28 days after ChAdOx1-S, but not after BNT162b2 (Whiteley et al. 2022). A case series of patients from Israel were documented to develop acquired Thrombotic Thrombocytopenic Purpura, a rare autoimmune disease, within several days of receiving the BNT162b2 vaccine.

Many possible vaccine injuries are confronted by clinicians and a small fraction of them are being reported in the medical literature. Some of the potential adverse events include myocardial infarction, myopathies (Montgomery et al 2021, Ramalingam et al. 2021), myocarditis (Terán et al. 2022; Mevorach et al. 2022), pericarditis (Singh et al. 2022), cancer (Panou et al. 2022), neuropathies (Waheed et al. 2021), allergies, Magro et al. 2021), Guillain-Barré Syndrome and optic neuritis (Sriwastava et al. 2021), among many others. Skin adverse reactions after COVID-19 mRNA vaccination include type I hypersensitivity (urticaria and anaphylaxis) and type IV hypersensitivity (COVID arm and erythema multiform) and autoimmune-mediated reactions. Vaccine reaction can may stimulate herpes reactivation or induction the development of autoimmune diseases (Fernández-Figueras et al. 2022).

Unfortunately, some clinicians have the belief that covid vaccines are so safe that they are unable to recognize and even perform adequate diagnostic evaluations to discard the possibility of vaccine damage. Some of the authors of this publication personally know specific cases that exemplify and back up this observation and intend to publish at least one case.

The COVID-19 vaccines have introduced new technology which is being used for the first time or been hurried abruptly into testing, bypassing animal experimentations. These vaccines have been implemented through emergency use authorizations. In addition, monitoring systems have been deficient in the collection of safety data, immunogenicity, effectiveness, and time span of protection, as well as short follow-up for a few months. There are valid concerns on well-recognized short-term and long-term safety issues including antibody-dependent enhancement, potential genomic transformation, the experimental nature of the vaccination process, the limited short-term follow-up in the main trials and other issues, the application of informed consent should become not only a requirement but also mandatory by law in accordance with all declarations on human rights (Mazraani, 2021).

There are individual case reports and small case series of serious adverse events that began to appear shortly after COVID-19 inoculations. These include thrombotic thrombocytopenia, which occasionally involved portal or hepatic vein thromboses and some degree of liver dysfunction, as well as acute liver injury, that often resembled

autoimmune hepatitis (Covid-19 Vaccines, 2021).

Mitochondrial dysfunction

The cascade of inflammatory factors triggered by SARS-CoV-2 seems to produce excess ROS, in the mitochondria leading to damage including mitochondrial membrane depolarization, and mitochondrial permeability transition pore opening. Recent in-vitro studies have confirmed that SARS-CoV-2 causes mitochondrial dysfunction and mitophagy impairment (Shang et al. 2022). Moreover, microglia treated with either spike protein or heat-inactivated SARS-CoV-2 trigger a striking reduction in mtDNA. It was proposed that mitochondria dysfunction was caused by the increased synthesis of reactive oxygen species in these organelles (Pliss et al. 2022).

Another aspect is that it has been found that the ACE-2 receptor can regulate mitochondrial activity. A decreased expression of ACE-2 is associated with reduced ATP synthesis and activation of NADPH oxidase 4, which promotes the production of reactive oxygen species (ROS).

NAD and mitochondrial function

Nicotinamide adenine dinucleotide (NAD) is an essential cofactor involved in cell bioenergetics for metabolism and ATP production. Treatment with the NAD (+) precursor nicotinamide riboside (NR) induced the mitochondrial unfolded protein response and synthesis of prohibitin proteins, and this rejuvenated MuSCs in aged mice. NAD maintains mitochondrial fitness through mechanisms such as the mitochondrial unfolded protein response.[iii] For this reason, it has been examined in a wide range of conditions from cancer to diabetes (Cantó et al. 2015).

Neurological symptoms and mitochondrial dysfunction

The SARS-CoV-2 virus is conspicuous for its ability to damage neural tissue, causing multiple neurological conditions (Hanson, 2022; Pliss, 2022) High viral load in patients with COVID-19 involving the CNS produces a compromised neuron with high-level energy metabolism. It's been proposed that a selective neuronal mitochondrial compromise results in SARS-CoV-2 Infection that results in om diminished cognitive processes including brain fog and other behavioral changes (Stefano et al. 2021).

The S protein stimulates the release of cytokines such as interleukin (IL)-10, TNF-α, and IFN-γ, which in turn further elevates mitochondrial ROS production through the upregulation of mitochondrial genes and modulation of the electron transport chain (ETC) (Saleh et al. 2020).

Other vaccine ingredients with potential toxicity (mRNA COVID-19 Vaccines)

The mRNA vaccines contain nucleotide instruction (mRNA) for the S protein encased in a nanoparticle composed of a lipid component that includes cholesterol and other synthetic lipids, polyethylene glycol (PEG), pegylated particles, several salt components, amines, acetic acid, and sucrose (Gonzalez, 2022). J&J uses an adenovirus as a delivery case, stabilizers, and manufacturing byproducts (Gonzalez, 2022). It is unknown if there are additional

undisclosed ingredients that are part of a proprietary formula that may have unidentified hazardous properties. More details on vaccine ingredients are found elsewhere (Gonzalez, 2022).

Near Infrared (NIR) light therapy (photobiomodulation)

The main target of light absorption in mammalian cells has been identified as the mitochondria and, more specifically, cytochrome c oxidase (CCO), the terminal electron acceptor of the mitochondria respiratory chain. It is thought that inhibitory nitric oxide can be dissociated from CCO, thus restoring electron transport and increasing mitochondrial membrane potential. Another potential mechanism involves the activation of light or heat-gated ion channels (Hamblin, 2018). In an in-vitro study conducted in human embryonic kidney cells, exposure to near-infrared light (NIR) caused a marked reduction in the TLR-4-dependent inflammatory response pathway responsible for the severe cytokine response in SARS, COVID-19 patients (Aguida et al. 2021). It resulted in a significant decline in NFkB and AP1 activity; decreased expression of inflammatory marker genes IL-6, IL-8, TNF-alpha, IFN-alpha, and IFN-beta as determined by qPCR gene expression assay; and an 80% decline in secreted cytokine IL6 as measured by ELISA assay. The proposed underlying cellular mechanism involves the modulation of ROS may downregulate the host immune response after Infrared Light exposure, leading to a decrease in inflammation (Aguida et al. 2021).

In other studies, the application of far-red to NIR light (630-1000nm) had been shown to reduce oxidative stress and inflammation in vitro and preserve mitochondrial integrity. This model system suggests that light treatment could mitigate early deleterious effects modulating inflammatory signaling and diminishing oxidative stress (Nonarath et al. 2021). In a randomized, double-blind, placebo-controlled trial with 28 high-level soccer athletes, it was determined that laser therapy at a 50 J dose significantly increases performance and improves biochemical markers related to skeletal muscle damage and inflammation determined as the maximum voluntary contraction (MVC), delayed onset muscle soreness (DOMS), creatine kinase (CK) activity, and interleukin-6 (IL-6) expression (Aver Vanin et al. 2015). At this point, there is encouraging data related to the capacity of NIR to reduce inflammation, control ROS, and improve mitochondrial function, however, clinical data supporting its clinical use is still limited.

Preventive or early nutritional nutraceutical protocol

Based on the known benefits of dietary interventions and nutritional supplementation supporting healthy physiological functions an orthomolecular protocol is suggested to reduce risks that may prevent or decrease some possible vaccine COVID-19-related complications or reduce their manifestations, focusing on safe interventions to support the control of the inflammation process, proper blood circulation, and hemostasis, and support metabolic energy production in the mitochondria. Please refer to table 1 for a summary of the key nutritional supplements for protection from post-vaccine adverse drug reactions (ADRs).

Nutrition (low Carb approach)

The basis of this protocol begins with a diet with moderate amounts of carbohydrates, free of refined or processed products* (No additives such as preservatives, or coloring) as these promote inflammation.

Carbohydrate craving and consumption are related to serotonin production. However, it is common for many people to indulge in high glycemic food consumption that increases the risk of developing obesity and a chronic state of inflammation, which can often lead to heart disease and diabetes which increase the risk for more serious complications of CoVID-19 (Wu et al 2020). Carbohydrate-restricted diets (CRD) improve atherogenic dyslipidemia and have been shown to reduce markers of inflammation and VEF. In a clinical trial, individuals undergoing statin therapy experience additional improvements in metabolic and vascular health by undergoing a 6-week CRD as demonstrated by increased insulin sensitivity, resistance vessel endothelial function, decreased blood pressure, and triglycerides (Ballard et al. 2013).

It has been found that highly processed food consumption may be associated with intestinal permeability biomarkers and inflammation (Um et al. 2022). The abundance of vegetables, mushrooms, legumes, and green leaves provides generous quantities of different fibers, micronutrients, and phytochemicals that help in any recovery process (Barnard et al. 2019; Muszyńska et al. 2018). Dietary fiber when fermented by the gastrointestinal microbiota produces short-chain fatty acids that support anti-inflammatory effects (Hills et al. 2019). Although the quality of food in sensible amounts can provide physiological benefits, it has been found that extending the periods between meals can enhance the benefit even further.

Intermittent Fasting

Intermittent fasting (IF) is a form of time-restricted feeding that generates physiological and epigenetic changes that become significant at around 16-18 hours but do not surpass 24 hours. IF has been demonstrated to provide several physiological benefits, such as improved glucose regulation, reduce oxidative damage and inflammation, and optimize energy metabolism. If has strong anti-inflammatory activity demonstrated in multiple prior studies, and it has been proposed to play a role in attenuating COVID -19 severity (Gnoni et al. 2021). Intermittent fasting can also induce autophagy, mitophagy, and other favorable cellular changes and has been proposed as adjuvants in the management of various chronic diseases (Mattson et al. 2017; Peña Crespo et al. 2022).

When using this protocol, diet, intermittent fasting, and basic supplementation are considered as the starting point. Because this protocol includes numerous supplement products, the priority on which ones to take should be placed according to the patient's individual risk factors, and symptoms. Patient past and present medical history, medications, symptoms, and laboratory can guide the decision in the selection of dietary supplements.

Basic general supplementation

For the purpose of explaining the principles of Dietary Supplementation, we

propose to classify the supplements into groups. The first group is the basic general supplements that provide the necessary co-factors that are frequently insufficient for general metabolic functions, especially to support the immune system. The other groups are supplements directed to support physiologic functions that are commonly altered in response to exposure to elevated levels of S-protein like COVID-19 infection or theoretically after administration of the mRNA vaccines, namely, inflammation, coagulopathies, and mitochondrial dysfunction.

Inadequacy of immune health nutrients

For the proper functioning immune system, it is necessary that micronutrients are provided in sufficient amounts to meet the physiologic demands. Some micronutrients like vitamin C are essential for every component of both the innate immune system as well as the adaptative system. A large amount of evidence indicates that nutrient inadequacies can damage the immune function and undermine the immune response. A recent analysis of micronutrient typical intake estimates based on nationally representative data in 26,282 adults (>19 years) from the 2005-2016 National Health and Nutrition Examination Surveys (NHANES) indicates a high prevalence of inadequacy in several micronutrients that are key to the immune system functioning. The micronutrients inadequacies found were: 15% of the U.S. population had a prevalence of inadequacy for zinc, 45% for vitamin A, 46% for vitamin C, 84% for vitamin E, and 95% for vitamin D (Reider et al. 2020). Moreover, the inadequacies were defined according to the estimated average requirement (EAR). The EAR is defined as the amount of a nutrient that is estimated to meet the requirement for a specific criterion of the adequacy of 50% of healthy individuals of a specific age, sex, and life stage (Medicine (US) Food and Nutrition Board 1998). This definition leaves out the requirements of 50% of the population and also leaves out the consideration of increased micronutrient needs of people with comorbidities. The Recommended Dietary Allowance (RDA) is the average daily level of intake sufficient to meet the nutrient requirements of nearly all (97–98%) healthy individuals. The RDA would have been a better criterion used to calculate the inadequacy of immune health nutrients. The micronutrient inadequacies revealed in this study on the US, highlight the importance of considering nutritional supplementation as part of an integrated plan for health maintenance, risk reduction, prevention, and severity of complications, especially during a time of health crisis (Rhodes et al. 2021; Fu et al. 2021; Shakoor et al. 2021).

Table 1. *Basic General Supplements*

Supplements	**Doses**	
Multivitamin & mineral - HD	1 tab/cap	QD
Vitamin C	1000 mg	TID
Vitamin D	2000-5000 IU	QD
Magnesium citrate	620 mg salt (100 mg elemental)	QD-BID

The multivitamin is to provide a robust dose of the B complex vitamins that are necessary for energy production reactions in the Krebs cycle as well as to partially compensate for the inadequacies in immune health nutrients mentioned before.

Vitamin D deficiency was associated with inflammation in older Irish adults (Laird et al. 2014). Vitamin D status was a significant predictor of the IL-6 to IL-10 cytokine ratio. The participants defined as deficient were significantly more likely to have an IL-6 to IL-10 ratio >2:1 compared with those defined as sufficient. These findings suggest that an adequate vitamin D status may be required for optimal immune function, particularly within the older adult population (Laird et al. 2014). Vitamin D produces epigenetic modifications that suppress cellular inflammation and improve overall endothelial functions. Available data support that adequate vitamin D supplementation and/or sensible sunlight exposure to achieve optimal vitamin D levels are important in the prevention of cardiovascular disease and other chronic diseases (Wimalawansa, 2016). Similarly, it may be useful to prevent or resolve complications from mRNA vaccines.

Regarding vitamin C, it has been shown to have effects in multiple pathophysiological stages of COVID-19, and since protein C is a common factor with the current vaccines it might provide multiple benefits (Miranda-Massari et al. 2021). The evidence to date has shown that oral vitamin C (2-8 g/day) may decrease the incidence and duration of respiratory infections and intravenous vitamin C (6-24 g/day) has been shown to reduce mortality, intensive care unit (ICU), and hospital stays (Holford et al. 2020).[iv]

Support for physiologic functions alterations

Inflammation

The first step in the infection COVID-19 infection is the interaction between Transmembrane Serine Protease 2 (TMPRSS2) activated by SARS-CoV-2 spike (S) protein and host cell receptor angiotensin-converting enzyme 2 (ACE-2) is a pre-requisite step for this novel coronavirus pathogenesis. Invitro studies have shown that bromelain treatment diminishes the expression of ACE-2 and TMPRSS2 and diminished the SARS-CoV-2 infection in VeroE6 cells (Sagar et al, 2020). Follow up studies revealed for that bromelain can suppress SARS-CoV-2 infection through ACE-2, TMPRSS2, and SARS-CoV-2 S-protein. Since bromelain reduces SARS-CoV-2 infection, and can protect from thrombotic complications of covid through its pronounced fibrinolytic activity, the use of bromelain should be considered as a safe antiviral against SARS-CoV-2 with potential to reduce some risks of complications. On the other hand, curcumin has shown anti-inflammatory and anti-inflammasome properties without minimal adverse effects (Saeedi-Boroujeni 2021). Since S-protein seems to be implicated in the activation of the inflammasome it can potentially play a role in the prevention and early treatment of post-vaccine-related injury (Saeedi-Boroujeni, 2021).

Bromelain and curcumin are well-known nutraceuticals with anti-inflammatory actions that had been used in the prevention of severe COVID-19. Since the S-protein is the primary mediator of the pathophysiologic processes, these natural substances can presumably be beneficial through the same mechanisms. Bromelain is a proteolytic enzyme isolated from the pineapple. Curcumin is a natural phenol found in turmeric. These two compounds have important immunomodulatory actions

participating in the crucial steps of COVID-19 pathophysiology. Some reports have shown a potential preventive value of the synergistic effects of bromelain and curcumin against severe COVID-19.[v] Boswellia serrata is a natural gum resin mainly composed of terpenoids, phenolic compounds, flavonoids, and phenylpropanoids traditionally used to treat chronic inflammatory diseases. published research that has shown evidence of potential therapeutic effects of boswellic acids (BA) and *B. Serrata* extract against COVID-19 and associated conditions, which may include the risks associated with exposure to the S-protein of any origin. Boswellia extract and boswellic acid have been shown to have antioxidant, anti-inflammatory, immunomodulatory, cardioprotective, and anti-platelet aggregation activities all of which may have protective values given the pathophysiologic mechanisms discussed in relation to the S-protein (Gomaa et al. 2021).

Table 2. Inflammation Supplements

Supplements	**Doses**	
Turmeric extract	500-1000 mg	BID
Bromelain	500 mg	BID
Boswellia extract	(800-1,200 gum resin (60% boswellic acid)	BID
Pycnogenol	100 mg pine extract std (bark). to 65% procyanidins	QD

*May also consider MSM, Ginger, Uncaria tormentosa

Trombi/Platelets (Circulatory)

The omega-3 fatty acids are essential lipids that are necessary for building and maintaining cell membranes, brain, eye structures, and hormones. They're also an energy source and help function of the heart, lungs, blood vessels, and immune system. Supplementation with high doses of omega-3 may have been shown to improve survival in patients with previous myocardial infarction and established heart failure. These protective effects have been attributed to the action of n-3 PUFA on systemic inflammation, hypertension, endothelial dysfunction, thrombosis, and cardiac arrhythmias, among others (Marangoni, 2013).

In an animal study, it was found that both alpha and gamma-tocopherol reduced platelet aggregation and delay thrombus formation, perhaps by an improvement in antioxidant activity (Saldeen, 1999). In a clinical trial healthy subjects consuming two forms of tocopherol significantly lower platelet activation after supplementation ($p<0.05$) (Singh, 2007).

Thrombosis is a major cause of cardiovascular disease, and a leading cause of morbidity and mortality worldwide. Conventional anti-thrombotic treatments often lead to bleeding complications. The thrombotic events are a result of an interaction of inflammation and coagulation, often influenced by ROS. A better alternative would be a safer anti-thrombotic agent with anti-inflammatory and anti-oxidative stress action. Nattokinase (NK) possesses many beneficial effects on cardiovascular system due to its robust thrombolytic, anticoagulant and antioxidative properties (Wu et al. 2020). In a clinical study with 1062

participants, the use of NK at a dose of 10800 FU/d significantly improved lipid profile and resulted in a significant reduction in the thickness of the carotid artery intima-media and the size of the carotid plaque (Chen et al. 2022. In a double-blind, placebo-controlled cross-over NK intervention study in 12 healthy young males demonstrated significant elevation in antithrombin and prolongation in PTT. NK was shown to enhance fibrinolysis and anti-coagulation via several different pathways simultaneously (Kurosawa et al. 2015). In addition, a group from Japan, found that nattokinase was able to degrade S protein in a dose and time dependent manner (Tsnikawa et al. 2022).

Energy - Mitochondria

A placebo-controlled, open-label phase 2 study and a double-blinded phase 3 clinical trial were conducted. The results show that treating patients infected with COVID-19 with a mixture of combined metabolic activators (CMAs) consisting of glutathione and NAD+ precursors lead to a significant shortening of the time to complete recovery. Results suggest a role for this therapeutic regimen (Altay et al. 2021).

Table 3. Circulatory supplements

Supplements	**Doses**
Omega-3	2 softgel = 1350 EPA/600 DHA) 2-4 softgel daily
Nattokinase	caps 100 mg (2000 FU) NSK-SD, 1 cap BID
Vitamin E (mixed tocopherols w/tocotrienols)	Alpha & gamma tocopherols + tocotrienols, 1 cap QD
	• Alpha-tocopherol 30-60 mg
	• Gamma-E mixed tocopherols 250-400 mg
	• Mixed tocotrienols 100-200 mg

*May consider the addition of garlic, ginkgo, and enzymes (bromelain, papain, trypsin, chymotrypsin)

Table 4. *Mitochondrial Optimizers*

Supplements	**Doses**
CoQ10 (Ubiquinone) or (ubiquinol active form)	100-300 mg QD
Alpha Lipoic acid (ALA) (R-lipoic	200-600 mg QD
Acetyl-L-Carnitine (ALCAR)	500-1000 mg QD
Nicotinamide Adenine Dinucleotide (NAD)	100-300 mg QD

*Additional mitochondrial optimizers

- Creatine
- NT lipids
- Ribose

Detoxification

As mentioned before, the mRNA vaccine is manufactured with a number of synthetic ingredients that include lipids, stabilizers, salts, and sucrose (Gonzalez, 2022). These serve various purposes including carrying and delivering the mRNA intracellularly and providing immunogenicity. These ingredients are presumed safe and tested for safety. However, these compounds have been suggested to trigger ASIA Syndrome (Shoenfeld & Agmon-Levin, 2011; Watad et al. 2017). [vi,vii] Both the SARS-Cov2 Pfizer/BioNTech and Moderna vaccines do not specify the use of adjuvants in their vaccines based on the premise that the RNA molecule exerts sufficient immunostimulatory effect (Chung et al. 2020).[viii]

The autoimmune/inflammatory syndrome induced by adjuvants (ASIA), described in 2011, covers a wide range of diseases like macrophagic myofasciitis syndrome, postvaccination phenomena, and others. It has been proposed to be a dysregulation of both innate and adaptive immune systems, following exposure to an adjuvant (Shoenfeld et al. 2011).[105] In a report of 52 cases meeting the criteria for ASIA syndrome, 41 developed the condition subsequent to papillomavirus vaccine administration, and eight cases after the influenza vaccination (Bragazzi et al. 2020).[ix] A case series was reported about three patients who developed thyroid autoimmune/inflammatory syndrome (ASIA) developed shortly after receiving an mRNA-based vaccine against SARS-CoV2 (Pujols et al.2022).[x]

Environmental and household pollutants and toxins

According to the WHO, the chemicals of most public concern include air pollutants, arsenic, asbestos, benzene, cadmium, dioxins, and similar compounds, fluoride, lead, mercury, and pesticides (WHO).[xi] The air pollutants of major public health concern include particulate matter, carbon monoxide, ozone, nitrogen dioxide, and sulfur dioxide. Outdoor and indoor air pollution cause respiratory and other diseases and are important sources of morbidity and mortality. WHO data show that almost all of the global population (99%) breathe air that exceeds WHO guideline limits and contains high levels of pollutants.[xii] People living in big cities are exposed to numerous toxins in the air, water, foods, household products, commercial products, industrial emissions and wastes, and even medical treatments. In addition to the previously mentioned, other contaminants that are a health hazard include some food preservatives, colorants, sweeteners, microplastics, herbicides, medications, electromagnetic fields, and noises.

The body has detoxification mechanisms to eliminate, at least in part. some of these toxins. However, these mechanisms are often insufficient to manage the extent of toxins managed by the body. Therefore, toxins can accumulate over time, producing oxidative stress and inflammation, genomic alterations and mutations, epigenetic alterations, mitochondrial dysfunction, endocrine disruption, altered intercellular communication, altered microbiome, and impaired nervous system function (Peters et

al. 2021).[xiii] This can eventually contribute to morbidity, and reduced lifespan. Animal models have shown that low-level concentrations of toxins such as Pb, Cd, nitrosamines, Benzopyrene, and nicotine in food over months can lead to a reduction of cellular and humoral immune responses (Stickl, 1991).[xiv] Given the potential pre-existing burden of toxins in the persons receiving an inoculation, the use of methods to facilitate detoxification may provide benefits. The process should consider addressing all detoxification and excretion routes, including the colon, kidney, liver, lung, and skin. For this purpose, water should be pure, and food should be organic, and rich in fibers, electrolytes, and phytochemicals that promote liver detoxification. Should consider a routine that includes sufficient aerobic exercise and sunlight (or sauna) infrared exposure to promote vigorous sweating.

Detoxification Supplements

Animal studies with chlorella reported being useful in detoxifying dioxins[xv], lead,[xvi] and mercury[xvii]. The use of chlorella in lead-exposed mice reverted bone marrow depression and improved cytokine production[xviii]. The use of chlorella as part of a program of long-term nutritional supplementation enhanced heavy metals removal in 16 patients (Merino et al. 2019).[xix]

Alpha lipoic acid is an organosulfur amphoteric compound that works as a cofactor in several mitochondrial multienzyme complexes, enhances the uptake of glucose by the cells, and modulates the activity of various signaling molecules and transcription factors. It can serve to chelate metal, restore glutathione, and control oxidative stress.[xx] The use of lipoic acid has been suggested in combination with other treatments in the management of toxic metal intoxication (Bjørklund et al. 2019).[xxi]

Zeolites are porous minerals with high absorbency and ion-exchanging capabilities. Naturally occurring zeolite clinoptilolite (ZC) has excellent detoxifying, antioxidant, and anti-inflammatory activities.[xxii] Zeolites have been shown to remove heavy metals from a variety of solutions and waste. A 90-day eco-toxicological experiment conducted in mice reduced Pb concentrations in exposed and supplemented mice by 91 to 77%, in various organs or excretions (Beltcheva et al. 2012).[xxiii]

Table 5. *Detox Supplements*

Supplements	Doses	
Chlorella	300 mg tablets	
	10-15 tablets	TID
Alpha Lipoic acid	300 mg (260 mg R-Lipoic)	BID
Zeolite	1 gram in water	TID

*Zeolite - ½ a teaspoon (1g) of Zeolite MED® Ultra-fine Powder into 200 ml of water, 30 minutes before or after eating, and drink immediately. Depending on your requirements, this can be done 1 to 3 times per day, with a maximum consumption of 3g a day.
*May also consider activated charcoal, milk thistle (), dandelion (Taraxacum), and cilantro.

Immune exhaustion

Although rare, some vaccines seem to have the potential to generate immunopathology following subsequent virus infection

(Johnson et al.2011). If vaccination generates intermediate numbers of specific CD8 T cells, the balance between virus clearance and immune exhaustion may be disrupted (Johnson et al. 2011).[xxiv] A study conducted in Japan informed reduced immune responses to repetitive vaccination against some strains of influenza type A virus, which resulted in a significantly diminished protection rate (Sugishita et al. 2020).[xxv] Repeated vaccinations have been suggested to be associated with reduced antibody-affinity maturation, which may decrease the vaccine effectiveness of seasonal influenza vaccines in humans (Khurana et al. 2019).[xxvi] Declining vaccine effectiveness with frequent recurring influenza vaccination has been documented in Canada (Kwong et al. 2020)[xxvii] and the United States (McLean et al 2014).[xxviii] Another concern with repeated vaccine inoculation is that it may intensify the disease process for certain infections. This has been reported with dengue and respiratory syncytial virus (Murphy & Whitehead 2011; Fulginiti et al. 1969).[xxix],[xxx] The well-recognized steady decrease in antibodies following SAR-Cov2 vaccine inoculations has been used to justify repeated multiple boosters over the last two years (Naaber et al. 2021).[xxxi] Antibody-dependent enhancement (ADE) has been suggested as a possible mechanism to explain the severity of COVID-19 cases initially observed in China compared with other regions of the world (Tetro, 2020).[xxxii] However, some studies suggest that ADE is not a prominent problem with SARS-Cov2 vaccine inoculations, and there is no evidence that ADE facilitates the spread of SARS-CoV in infected hosts (Sánchez-Zuno et al. 2021).[xxxiii] The hypotheses regarding ADE are therefore conflictive and somehow even contradictory.

A number of in-vitro and observational studies, and clinical trials, support the important role of vitamins A, C, and D, omega-3 fatty acids, and zinc in modulating the immune response against viral infections (Pecora et al. 2020)[xxxiv]. The presence of some micronutrients in sufficient amounts is necessary for modulating immune homeostasis. Nutrients have significant modulatory roles in innate immunity and inflammation by adapting the expression of TLRs, and pro- and anti-inflammatory cytokines, thus meddling with immune cell crosstalk and signaling. Micronutrients may act as cofactors or blockers of enzymatic activity and influence molecular pathways and biochemical reactions linked with microbial killing, inflammation, and oxidative stress. Clinical data support the benefits of micronutrient supplementation on immunity and disease (Tourkochristou et al. 2021).[xxxv] Magnesium insufficiency has been suggested to be a potential cause of immune dysfunction, cytokine storm, and disseminated Intravascular coagulation in covid-19 patients (DiNicolantonio et al. 2021) and even with a risk of early transmission (Tian et al. 2022). N-Acetyl cysteine (NAC) has been proposed as a potential therapeutic agent in the treatment of COVID-19 through a variety of potential mechanisms, including increasing glutathione, improving T-cell response, and modulating inflammation (Poe & Corn, 2020). Quercetin is a flavonoid with anti-allergic and anti-inflammatory effects mediated through the inhibition of the

cyclooxygenase and lipoxygenase pathways. It controls platelet aggregation, promotes the relaxation of cardiovascular muscles, and helps in neuroprotection. At this time, there are at least 14 interventional clinical trials in progress assessing the efficacy of quercetin as a prophylaxis/treatment option against COVID-19 (Pawar et al. 2022). Data shows that aging individuals at the highest risk for morbidity and mortality from COVID-19 are aging, with comorbidities such as diabetes, heart disease, obesity, and others all of which promote inflammation and NF-κB. There are many factors that improve inflammation, including factors that promote autophagy, mitochondrial function, a healthy microbiome, and phytochemicals such as resveratrol (Rea & Alexander 2022).[xxxvi] Resveratrol is a potent antioxidant with an antiviral activity that can reverse excessive inflammatory and oxidative stress and antiviral immunity (Liao et al. 2021).

Table 6. ***Immune Supporting Nutrients***

Supplements	**Doses**
Zinc (gluconate or picolinate)	25-30 mg QD
Magnesium citrate	500 mg TID
NAC	600 mg BID
Quercetin	500 mg QD
Resveratrol	100-250mg (Trans-Resveratrol)

Table 7. ***Summary of Key Supplements for Protection from Post Vaccine ADR's***

Supplements	**Doses**	
Multivitamin & mineral - HD	1 tab/cap	QD
Vitamin C	1000 mg	TID
Vitamin D	2000-5000 IU	QD
Magnesium citrate	620 mg salt (100 mg elemental)	QD-BID
Inflammation Supplements*		
• Turmeric extract	500-1000 mg	BID
• Bromelain	500 mg	BID
• Boswellia extract	(800-1,200 gum resin (60% boswellic acid)	BID
• Pycnogenol	100 mg pine extract std. to 65% procyanidins	QD
Circulatory supplements*		
• Omega-3	2 softgel = 1350 EPA/600 DHA) 2-4 softgel daily	
• Nattokinase	caps 100 mg (2000 FU) NSK-SD, 1 cap	BID
• Vitamin E (mixed tocopherols w/tocotrienols)	Alpha & gamma tocopherols + tocotrienols 1 cap	QD
Detox supplements*		
• Chlorella	300 mg tablets 10-15 tablets	TID
• Alpha Lipoic acid	300 mg (260 mg R-Lipoic)	BID
• Zeolite	1 gram in wáter	TID

Conclusion

There is a need to identify, prevent, and treat these spike protein complications including post-vaccine adverse events to reduce any further harm and damage that have arguably been considerably more numerous and prevalent than what has been reported. In this article we present an orthomolecular protocol, based on diet modification, fasting, dietary supplement and other interventions that may address all pathophysiological issues (i.e., inflammation coagulation, and mitochondrial dysfunction) reported as post-vaccine injuries and give natural options to prevent damages and provide the physiological support needed to restore normal function, focusing on nutrition and nutraceutical supplementation.

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