

MD+MVM **VERSION VI**



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MVM is a comprehensive, specially balanced, multiple vitamin and mineral formula, with added ingredients, designed to promote health and wellness, improve energy and cognition, decrease fatigue, and boost your immune system.

MVM also acts as a foundation for those looking to improve body composition, mental and physical performance, and improve life and healthspan.

MVM provides full spectrum nutritional support regardless of your needs. MVM is especially useful for anyone who diets and/or exercises or is under physical or mental stress whatever the cause.

MVM is the Swiss Army Knife (Champ XAVT version) of nutritional vitamin and mineral supplements and represents a paradigm shift compared to all of the rest on the market today.



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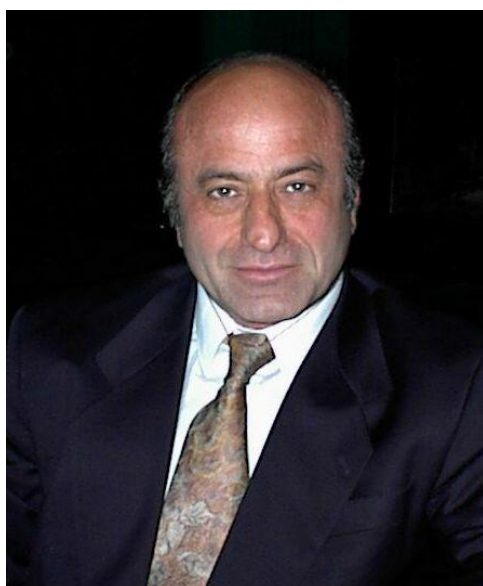
MVM – Advanced Evidence Based Formulation

MVM is the most complete multiple vitamin and mineral supplement on the market for anyone and especially for those who are interested in the many aspects of health, weight loss, body composition and athletic performance.

While the scientific and medical consensus for the general population over the years was that you could get all the micronutrients you needed from food, that has changed as the realization that the combination of diets that are not usually optimal, and the consumption of processed foods and foods grown in deficient soils no longer provides the full spectrum of nutrients that we need for optimal health and even to deal with our polluted environment.

The use of MVM is even more important for those who exercise, as I'll point out below.

Formulated by Mauro Di Pasquale, B.Sc. (Hons), M.D.



Dr. Di Pasquale is an author, a former world Powerlifting champion, a former professor at the University of Toronto, and actively involved in, researching and experimenting on all aspects of training, nutrition, improving body composition and mental and physical performance, for over six decades. He was and still is nutrition, exercise and sports orientated. He was also an elite national and international athlete for over four decades in a variety of sports.

He is presently a physician in Ontario, Canada, and for the last five decades plus has specialized in Sports Medicine, Exercise Performance, Nutrition, Nutritional Supplements, Bariatric Medicine (treatment of obesity), Anti-Aging, and all aspects of health and well-being.

Highest Quality at a Reasonable Price

The list price of MVM doesn't reflect the high quality and quantity of ingredients in MVM or the precision and care taken in its production. MVM is manufactured in a pharmaceutical grade facility that follows good manufacturing practices and is NSF certified.

MVM is of such high quality that contamination with impurities is negligible since it's as low as is commercially possible and lower than most of our food supply. Contamination with ingredients not on the label is zero (something of concern to drug tested athletes). We make sure of that by running GC/MS analysis of each batch to ensure its quality and purity.

Couple that with the cutting-edge evidence-based formulation and it's easy to see that MVM is a product that is of unparalleled quality and effectiveness and guaranteed to have in it what's on the label, and nothing else.

MVM version VI Supplement Panel

Supplement Facts:		Serving Size: 4 Tablets	Servings Per Container: 30	
	Amount Per Serving	% Daily Value	Amount Per Serving	% Daily Value
Vitamin A (as Palmitate)	2500 IU	50%	Copper (as Copper Gluconate)	500 mcg 25%
Beta-Carotene	10000 IU	200%	Manganese (as Manganese Gluconate)	5 mg 250%
Vitamin C (as Ascorbic Acid and Calcium Ascorbate)	500 mg	830%	Chromium (as Chromium Amino Acid Chelate)	50 mcg 40%
Vitamin D3 (as Cholecalciferol & Calcifediol)	1200 IU	300%	Molybdenum (as Sodium Molybdate)	10 mcg 15%
Vitamin E (as d-Alpha Tocopherol Succinate)	400 IU	1330%	Potassium (as Potassium Phosphate and Aspartate)	199 mg 6%
Vitamin K1 (as Phytonadione)	100 mcg	125%	Bioperine® (Black Pepper Extract (Piper Nigrum))	5 mg *
Vitamin K2 (as 50/50% MK-4 and MK-7)	80 mcg	100%	Boron (as Amino Acid Chelate)	2 mg *
Vitamin B1 (as Thiamine Mononitrate)	50 mg	3330%	DigeZyme™ (Aspergillus Oryzae)	100 mg *
Vitamin B2 (as Riboflavin)	50 mg	2940%	L-Taurine	150 mg *
Vitamin B3 (as Niacin, Niacinamide & Inositol Hexanicotinate)	90 mg	450%	Choline Bitartrate	150 mg *
Vitamin B6 (as Pyridoxine HCL & Pyridoxal-5-Phosphate)	50 mg	2500%	Betaine (Trimethylglycine)	100 mg *
Folate (as Folinic Acid)	1000 mcg	250%	Panax Ginseng Extract (Root)	100 mg *
Vitamin B12 (as Methylcobalamin)	500 mcg	8330%	Acetyl-L-Carnitine	100 mg *
Biotin	300 mcg	100%	Alpha Lipoic Acid	100 mg *
Pantothenic Acid (as d-Calcium Pantothenate and Pantethine)	50 mg	500%	Inositol Hexanicotinate	75 mg *
Calcium (as Calcium Phosphate, Citrate and Ascorbate)	400 mg	40%	L-Carnosine	50 mg *
Iron (as Ferrous Fumarate)	10 mg	55%	N-Acetyl-L-Cysteine	50 mg *
Phosphorus (as Calcium, Magnesium and Potassium Phosphate)	300 mg	30%	Citrus Bioflavonoids Complex	50 mg *
Iodine (as Potassium Iodide & Kelp)	150 mcg	100%	PABA (Para-Aminobenzoic Acid)	50 mg *
Magnesium (as Magnesium Phosphate and Aspartate)	300 mg	75%	Coenzyme Q10	40 mg *
Zinc (as Zinc Monomethionine Aspartate and Picolinate)	18 mg	120%	Lutein	5 mg *
Selenium (as L-Selenomethionine & Sodium Selenite)	50 mcg	70%	Astaxanthin	4 mg *
MVM Proprietary Formula – 1542 mg				
Glutamine Peptides (from Casein), Lactobacillus Acidophilus 150B/G, Green Tea Extract, Phosphatidylcholine, Phosphatidylserine (from Non-GMO Sunflower Lecithin), L-Lysine, Quercetin, Ganoderma Lucidum, L-Glutamic Acid, Grape Seed Extract, Turmeric Extract, Pine Bark Extract, Astragalus Root, Ginkgo Biloba Extract, Hesperidin, Rutin, Schizandra Berry Extract, Milk Thistle Extract (80% Silymarin), Beet Extract (root), Pomegranate extract, Spirulina.*				
Other Ingredients: Rice Bran, Microcrystalline Cellulose, Hydroxypropylmethyl Cellulose, Croscarmellose Sodium, Glycerin.				
*Daily Value not established				

Covid-19 Pandemic and MVM

As you can see from the Supplement Panel above, and in the text of this information paper, MVM contains several dozen ingredients that boost the immune system and help protect us from opportunistic infections, including Covid-19, as well as helping us heal from them if we become infected. Inadequate intake and status of these nutrients are widespread, leading to a decrease in resistance to infections and as a consequence an increase in disease burden.¹

The ingredients in MVM are many and include Vitamin A, Beta Carotene, Vitamin B6, Vitamin B12, Folate, Vitamin C, Vitamin D, Vitamin E, niacin, Vitamin K1 (as phytonadione) and K2 (as MK-4 and MK-7), zinc, iron, copper, selenium, magnesium, green tea polyphenol (-)- epigallocatechin-3-gallate, resveratrol (in grape seed extract), curcumin, quercetin, lipoic acid, astaxanthin, lutein, coenzyme Q10, L-carnitine, and many other flavonoids, polyphenols and extracts.

As an example, a recent study found that an adequate supply of zinc, selenium, and vitamin D is essential for resistance to other viral infections, immune function, and reduced inflammation.² Another

recent study found that quercetin and vitamin C were potentially synergistic therapy for Covid-19 prevention and treatment.³ And another recent study postulated that vitamin supplementation, which has proven to treat or prevent infectious diseases because of their antimicrobial and immunomodulatory activity, has a role in Covid-19 treatment or prevention.⁴

Relevant information on most of these ingredients, and their effects on the immune system and opportunistic infections, as well as references, are contained below under [Optimizing Your Immune System, Helping to Fight the Adverse Effects of Pollution with MVM](#), and [Vitamin D and the Covid-19 Pandemic](#), as well as in the information on the specific ingredients.

All the Important Ingredients and Much More

MVM contains all the vitamins and minerals deemed important for optimal health, and at levels that provide beneficial effects above and beyond amounts needed to deal with any frank and marginal deficiencies that may be present.

With its evidence-based approach, meaning that there are valid scientific and medical reasons behind the use of each of the ingredients in MVM, MVM is a supplement that caters to everyone in our modern-day society, including the special needs of those looking to lose weight and body fat, those involved in fitness, exercise, and athletic competition, and those wishing to improve their health and immune system.

Besides the full complement of vitamins and minerals MVM also contains several nutrients that are felt to improve metabolism, decrease stress, and have anti-cancer and anti-aging properties (see table below).

As an example of the beneficial effects of MVM on health, a recent study found that high amounts of some of the B vitamins, as found in MVM, helps to counteract the polluted air found in cities and even in rural areas where people live close (up to a mile) to moderate to heavily used roads (more on that below).

Another recent study found that “dietary vitamin B12 alleviates mitochondrial fragmentation, bioenergetic defects, and oxidative stress, delaying A β -induced paralysis without affecting A β accumulation. Vitamin B12 has this protective effect by acting as a cofactor for methionine synthase, impacting the methionine/S-adenosylmethionine (SAME) cycle. Vitamin B12 supplementation of B12-deficient adult A β animals is beneficial, demonstrating potential for vitamin B12 as a therapy to target pathogenic features of Alzheimer Disease triggered by proteotoxic stress.”⁵

MVM and Athletes

MVM is designed not only to safeguard overall health, but also to provide for the special needs that the athlete has for body maintenance, recuperation and repair. MVM supplies all the basic nutrients that may be depleted in those who exercise and is formulated to enhance the effects of training on body composition and performance.

MVM is so complete that you don't have to worry if you might be marginal or frankly deficient in one or more of the essential nutrients. Also, MVM contains the highest quality and most effective ingredients to enhance, health

There are supplements that cost more, including the various pak ones that spread their ingredients over several tablets in a marketing ploy to make

energy, body composition and physical and mental performance.

For example, MVM contains high doses of **Folic acid, Vitamin B6, Betaine** and **Methylcobalamin**, the biologically active form of **B12** (not the cyanocobalamin, the synthetic and not as metabolically active form of B12 that is generally used).

them out to be more than what they really are, but there's none on the market that's comes close to MVM.

This group of ingredients has important effects on macronutrient metabolism, energy systems, and on combating the adverse effects of pollution and mercury toxicity. The health effects of all four of these ingredients have been extensively documented. Several of the medical parameters, such as homocysteine, cholesterol and C-Reactive Protein, markers of heart disease and inflammation in the body, are decreased by their use and by some of the other ingredients in MVM including the extensive number of antioxidants.

MVM is formulated to be the best vitamin mineral complex on the market regardless of price and is especially useful for anyone who diets and/or exercises. Athletes who are concerned about body composition and performance will find MVM is ideally suited for them and the ingredients in MVM will help support their training and diet efforts.

For example, many preparations don't contain iron even in low levels. However, iron is important for many at least in minimal replacement doses, as in MVM, since it's an important part of daily supplementation for who exercise.

Also, many preparations include beta carotene (as does MVM) but not vitamin A, if any vitamin A that is needed by the body (for many functions including maximizing testosterone production and increasing insulin sensitivity) will come from the endogenous conversion of beta carotene to vitamin A. This is not necessarily the case. As such MVM contains 2000 IU of vitamin A and 10,000 IU of beta carotene - just to cover all the bases.

MVM contains 400 IU of vitamin E, a level that I feel is necessary for athletes. Many of the other products, mainly because of expense contain about half that dose.

Athletes need high doses of the B vitamins, and again MVM has much more of all the B vitamins than other products. As well, higher doses of B vitamins are instrumental in decreasing the effects of pollution on our bodies – see below.

Besides hefty doses of the all the necessary usual vitamins and minerals, in the most bioavailable forms, MVM contains a lot more ingredients to round out the formula and give you everything you could possibly need as a foundation for maximizing health, body composition and performance.

For example, MVM contains carnosine (a buffering agent and antioxidant that is implicated in both the muscle fibers that hypertrophy with resistance exercise and exercise performance, taurine, glutamine⁶ peptides, etc. that are targeted for athletes for improving muscle mass, strength and performance and maximizing body composition. As an example, click on the link to see updated information on [taurine](#).

Recovery and repair of tissues require a host of vitamins and minerals that participate in synthesis of new cells and tissue. Providing these in supplement form can increase health and decrease disease.

Vitamin B12 - The most expensive B vitamin in any product is vitamin B12. MVM has several times as much Vitamin B12 as most preparations. The usual form of vitamin B12 is called cyanocobalamin, a cheaper and synthetic form of B12. Cyanocobalamin is changed into the body to the active form of cobalamin in a reaction that strips off the cyanide molecule. In MVM, I use 500 mcg of the much more expensive, metabolically active methylcobalamin.

Vitamin A and Beta Carotene - there are a lot of misconceptions about vitamin A's functions, metabolism and toxicity, and about the role of carotenoids.

Vitamin A is much more metabolically active than most people believe. Besides the common knowledge that it's involved in eyesight, it also important for proper immune, gastrointestinal, musculoskeletal, and hormonal functioning, and for the utilization of protein. For example, adequate body levels of vitamin A are important for testicular, ovarian, pituitary, and adrenal function, and for the production of testosterone and growth factors.⁷⁸⁹

Increased levels of vitamin A are necessary under conditions that deplete vitamin A reserves, such as high protein diets and chronic physically demanding exercise (as seen in any elite athlete), and any polymorphisms that affect the absorption, metabolism and utilization of vitamin A. There is also deficient intake in our society in those who diet to lose weight, minimize body fat, and maximize body composition.

Several studies have shown that vitamin A (retinal) and retinoic acid (the active metabolite of vitamin A) are required for growth and development and have important functions in the body on health and metabolism, including regulating energy homeostasis, insulin responses, and adipocyte and neuron differentiation and maintenance.^{10, 11, 12, 13, 14, 15}

Vitamin A has significant body composition effects and is instrumental in decreasing body fat. Vitamin A reduces lipid accumulation, induces lipolysis and fatty acid oxidation, and reduces the accumulation of body fat and decreases the number and size of fat cells.¹⁶¹⁷¹⁸¹⁹

Vitamin A toxicity is often misunderstood and while subclinical and clinical toxicities do occur, they're not common even at consistent long-term levels of 10,000 IU a day. Although vitamin A can cause liver damage, this damage typically occurs with daily doses of at least 25,000 units a day taken for several months. However, for both effectiveness and safety, MVM contains 3,000 IU of vitamin and a healthy dose of the pre-cursor beta-carotene.

Beta carotene has two roles in the body. It is a potent antioxidant and has beneficial effects on the immune system. As well, it can be converted into vitamin A, especially if there is a marginal or frank deficiency of vitamin A.

Beta-carotene's conversion to vitamin A in the body is limited by a feedback system.²⁰ Supplementing the diet with beta-carotene does not produce any vitamin A toxicity despite its use in very high doses since it's only metabolized to vitamin A slowly and as needed. With adequate levels of vitamin A in the system the feedback mechanism markedly decreases the transformation of beta carotene into vitamin A, with the decrease being proportional to body levels of vitamin A.

Optimizing Your Immune System

The body needs certain vitamins and minerals to make compounds that fight inflammation in the body and bolster the immune system, especially if a deficiency exists and in some cases even if there is no deficiency and more of the nutrients are needed, including Vitamin A, Vitamin B6, Vitamin B12,

Folate, Vitamin C, Vitamin D, Vitamin E, niacin, zinc, iron, copper, selenium and magnesium.²¹²²²³²⁴²⁵²⁶²⁷²⁸ For more information read a recent review titled [**A Review of Micronutrients and the Immune System—Working in Harmony to Reduce the Risk of Infection.**](#)

Many of the vitamins, minerals and other ingredients also increase energy, decrease fatigue and improve cognition²⁹ Information on the role of vitamins and minerals can be found in the recent review [**Vitamins and Minerals for Energy, Fatigue and Cognition: A Narrative Review of the Biochemical and Clinical Evidence.**](#)

The immune system is composed of a network of elements in our bodies for the sole purpose of protecting us from many of the insults we endure due to increasing pollution, mutations and genetic predisposition that lead to neurological disorders and cancer, and various infectious and parasitic agents including bacteria, fungi, viruses, and prions.

Many vitamins and minerals also serve as antioxidants and help protect cells against the oxidative damage produced by inflammation and improve the immune system's response to insults such as pollution and infectious agents, including viruses and prions. This can be seen in the beneficial effects of various individual vitamins and minerals in MVM, and in the synergistic effects seen among many of these nutrients.

Helping to Fight the Adverse Effects of Pollution with MVM

For more specific and updated information on the adverse effect of pollution on health, morbidity, and longevity refer to my updated article as of August 2020 [**Pollution as Evolution of the Species?**](#) As mentioned in that article, *“The world is a cesspool of pollution. There are many forms of pollution including visual, light and noise pollution, littering, and plastic pollution. While all forms of pollution are important, the most important is what I call body pollution.”*

Pollution, and especially particulate matter in air pollution (most coming from motor vehicle exhaust and especially diesel exhaust mainly from trucks), is counter-productive for physiological and psychological health, body composition, and exercise/athletic performance.³⁰³¹

Aerobic training in urban environments, both indoor and outdoor, and in rural environments under certain conditions, such as living or training close to pollution heavy manufacturing facilities and roads with moderate to high traffic and major highways, increases inflammation and decreases the beneficial effects of exercise on health, body composition, and performance.³²³³³⁴

Besides all the bad effects of air pollution, both outdoor and indoor, exposure to any air pollution, even short-term and low levels, increases morbidity, all-cause mortality, and universally decreases lifespan.³⁵³⁶³⁷³⁸

A recent study looking at 60 million Americans found that long term exposure to even low levels of fine particulate air pollution (levels below what the National Ambient Air Quality Standards consider safe) significantly increased the risk of premature death.³⁹

Although most of us are aware of outdoor air pollution given the ubiquitous coverage of global warming due to vehicle, industrial, agricultural, personal and other contributions to air pollution, many of us are not as aware of indoor air pollution, both in our homes and indoor public places such as casinos, that can be due to first, second, and third hand smoke, indoor use of chemicals, pesticides, building materials and even natural sources from the ground up.⁴⁰⁴¹⁴²⁴³⁴⁴⁴⁵⁴⁶

There were dozens of presentations on the adverse effects of pollution on health and disease at the American Thoracic Society 2017 INTERNATIONAL CONFERENCE held on MAY 19-24, 2017 in WASHINGTON, D.C.

Presentations and Topics included:

- Outdoor Air Pollution and Environmental Mitochondriomics Program Respiratory Health in Childhood R. Wright, MD, MPH, New York, NY.
- Biological Aging and Air Pollution A. Peters, MD, Munich, Germany.
- Relationship of Air Pollution to Sleep Disruption: The Multi-Ethnic Study of Atherosclerosis (MESA) Sleep and MESA-Air Studies/M.E. Billings, D.R. Gold, P.J. Leary, A. Szpiro, C.P. Aaron, J.D. Kaufman, S.S. Redline, Seattle, WA, p.A2930.
- Effect Modification by Differing Omega-6(n-6) to Omega-3 (n-3) Ratios on the Adverse Changes in Fibrinogen Associated with Ambient Particulate Air Pollution/D.P. Croft, S.J. Cameron, C.N. Morrell, C.J. Lowenstein, F. Ling, W. Zareba, P.K. Hopke, K. Thevenet-Morrison, S.W. Thurston, K. Evans, M.J. Utell, D. Chalupa, R. Block, D.Q. Rich, Rochester, NY, p.A6831.
- Several presentations under the umbrella: POLLUTION EFFECTS ON THE EPIGENOME IN THE DEVELOPMENT OF CHRONIC LUNG DISEASE Assemblies on Respiratory Cell and Molecular Biology; Allergy, Immunology and Inflammation; Environmental, Occupational and Population Health; Respiratory Structure and Function.
- Several presentations under the umbrella: AIR POLLUTION AND PSYCHOSOCIAL STRESS with an emphasis on recognizing how psychosocial stressors impact negative health outcomes associated with air pollution exposure.
- Epidemiologic and Epigenetic Evidence of Links Between Air Pollution, Stress and Negative Respiratory Health Outcomes J. Clougherty, MSc, ScD, Pittsburgh, PA.

One of the presentations, the Relationship of Air Pollution to Sleep Disruption, was on how air pollution disturbs sleep. The researchers analyzed data from 1,863 participants and found in the words of one of the authors of the study “that commonly experienced levels of air pollution not only affect heart and lung disease, but also sleep quality. Improving air quality may be one way to enhance sleep health and perhaps reduce health disparities.”

Disrupted sleep patterns are counterproductive for those wanting to improve health, body composition, and physical and mental performance.⁴⁷⁴⁸⁴⁹⁵⁰⁵¹⁵²⁵³⁵⁴

Many of MVM’s ingredients, and dosages, are meant to decrease the adverse effects of pollution on our health, body composition, and physical and mental performance.

For example, recent papers have found that high doses of certain B vitamins (as found in MVM but not in most of other vitamin mineral supplements) decrease the adverse effects of both short term and long term fine particle pollution on the cardiovascular, neurological, and immune systems by modulating the epigenetic modifications that occur secondary to environmental pollution.⁵⁵⁵⁶

As well, several papers have documented the beneficial on overall health, cardiovascular, neurological, and immune systems, improvement in cognition, body composition and performance, effects on reducing inflammation (from pollution and other causes), and helping to fight off infections **including bacterial and viral**, and if infected to help healing, of other ingredients in MVM including **green tea polyphenol (-)- epigallocatechin-3-gallate, resveratrol (in grape seed extract), curcumin, quercetin, lipoic acid, astaxanthin, lutein, coenzyme Q10, L-carnitine, and many other flavonoids, polyphenols and extracts.**⁵⁷⁵⁸⁵⁹⁶⁰⁶¹⁶²⁶³⁶⁴⁶⁵⁶⁶⁶⁷⁶⁸⁶⁹⁷⁰

A study published last year found that resveratrol had a protective effect against the genotoxic herbicide glyphosate (contained for example in Roundup, the most widely used herbicide in the USA).⁷¹

MVM version VI

Version VI of MVM represents the ongoing improvement over 2 decades (Version I was formulated in 1997) of the best multiple vitamin and mineral supplement available anywhere.

As well as a full array of vitamins and minerals that surpasses any of the other multis, MVM also contains a variety of ingredients meant to enhance its effects on health, longevity, body composition and physical and mental performance.

In keeping with the aim of maximizing health and meeting the needs of those who exercise and who are looking to improve body composition, the formulation for MVM has been improved, with more of some of the ingredients, such as vitamin D, folic acid, iodine, chromium, and over a few dozen new ingredients, including vitamin K1 and K2, Digezyme, Bioperine, and a dozen or so added ingredients, such as various plant extracts, and several others that positively impact on health and metabolism.

Vitamin D

For more detailed and up to date information see my dedicated ongoing article on [vitamin D](#).

Vitamin D (in the form of cholecalciferol or vitamin D3 rather than the less effective vitamin D2⁷² found in other nutritional supplements) has been increased to 1200 IU since it's been shown we need more vitamin D than was once thought and that marginal deficiencies of vitamin D are common.

Vitamin D along with Calcium is intimately involved in skeletal homeostasis. But each does much more. Vitamin D has several vital functions outside this established role. Vitamin D has been shown to have important implications for general, musculoskeletal, cardiometabolic, and immune system health, and cognitive function.^{73, 74, 75, 76, 77, 78, 79, 80}

As well, vitamin D is intimately involved in improving body composition, athletic performance, and decreasing the risk of injury.^{81, 82, 83, 84, 85, 86, 87, 88, 89}

Vitamin D and the Covid-19 Pandemic

Recent evidence has shown that optimizing and even going beyond optimum levels of vitamin D has potential in offering some protection against and treatment for the Covid-19 pandemic.

Even before any of the research came out citing the advantages of vitamin D, I was already taking at least 5000 units per day starting in early February of this year. My usual intake prior to then was in the 2000 to 4000 IU range. My vitamin D intake comes through my use of MVM, EFA+ and several other supplements in my lineup that contain vitamin D.

My most recent test for vitamin D shows that my level is at the very high normal range, exactly where I want it to be.

As an aside, I don't just formulate the products in my nutritional supplement lineup, I use them exclusively every day and have been for decades.

Vitamin D has an immune-modulating effect and can lower inflammation. As well, vitamin D boosts immune function against viral diseases. In all vitamin D may be relevant to the cytokine storm and damaging respiratory response to COVID-19. In the past few months, several papers have been published on the beneficial effects of vitamin D, many advising higher daily doses, on the current Covid-19 pandemic.⁹⁰⁹¹⁹²⁹³⁹⁴⁹⁵⁹⁶

As well, other ingredients, for example vitamins A, B₆, B₁₂, C, D, E, and folate; trace elements, including zinc, iron, selenium, magnesium, and copper; quercetin, and the omega-3 fatty acids eicosapentaenoic acid and docosahexaenoic acid, present in [MVM](#), [EFA+](#) and other products in my line of supplements, have beneficial effects on the immune system, giving a protective effect on a variety of stressors including infectious agents such as bacterial and viral infections.⁹⁷

For more information on bolstering the immune system and therefor improving your ability to fight off stressors including bacterial and viral infections, see the two sections above on **Pollution** and **Optimizing the Immune System**.

Abstracts of Interest. And Links to the full papers

Early Nutritional Interventions with Zinc, Selenium and Vitamin D for Raising Anti-Viral Resistance Against Progressive COVID-19.

Alexander J, Tinkov A, Strand TA, Alehagen U, Skalny A, Aaseth J. *Nutrients*. 2020 Aug 7;12(8):E2358. doi: 10.3390/nu12082358. PMID: 32784601.

Abstract

Objectives: The novel coronavirus infection (COVID-19) conveys a serious threat globally to health and economy because of a lack of vaccines and specific treatments. A common factor for conditions that predispose for serious progress is a low-grade inflammation, e.g., as seen in metabolic syndrome, diabetes, and heart failure, to which micronutrient deficiencies may contribute. The aim of the present article was to explore the usefulness of early micronutrient intervention, with focus on zinc, selenium, and vitamin D, to relieve escalation of COVID-19.

Methods: We conducted an online search for articles published in the period 2010-2020 on zinc, selenium, and vitamin D, and corona and related virus infections.

Results: There were a few studies providing direct evidence on associations between zinc, selenium, and vitamin D, and COVID-19. Adequate supply of zinc, selenium, and vitamin D is essential for resistance to other viral infections, immune function, and reduced inflammation. Hence, it is suggested that nutrition intervention securing an adequate status might protect against the novel coronavirus SARS-CoV-2 (Severe Acute Respiratory Syndrome - coronavirus-2) and mitigate the course of COVID-19.

Conclusion: We recommended initiation of adequate supplementation in high-risk areas and/or soon after the time of suspected infection with SARS-CoV-2. Subjects in high-risk groups should have high priority as regards this nutritive adjuvant therapy, which should be started prior to administration of specific and supportive medical measures.

The role of vitamin D in the prevention of coronavirus disease 2019 infection and mortality.

[Ilie PC](#)¹, [Stefanescu S](#)², [Smith L](#)³.

Abstract

WHO declared SARS-CoV-2 a global pandemic. The present aim was to propose an hypothesis that there is a potential association between mean levels of vitamin D in various countries with cases and mortality caused by COVID-19. The mean levels of vitamin D for 20 European countries and morbidity and mortality caused by COVID-19 were acquired. Negative correlations between mean levels of vitamin D (average 56 mmol/L, STDEV 10.61) in each country and the number of COVID-19 cases/1 M (mean 295.95, STDEV 298.7, and mortality/1 M (mean 5.96, STDEV 15.13) were observed. Vitamin D levels are severely low in the aging population especially in Spain, Italy and Switzerland. This is also the most vulnerable group of the population in relation to COVID-19. It should be advisable to perform dedicated studies about vitamin D levels in COVID-19 patients with different degrees of disease severity.

Early nutritional supplementation in non-critically ill patients hospitalized for the 2019 novel coronavirus disease (COVID-19): Rationale and feasibility of a shared pragmatic protocol.

[Caccialanza R](#)¹, [Laviano A](#)², [Lobascio F](#)³, [Montagna E](#)³, [Bruno R](#)⁴, [Ludovisi S](#)⁴, [Corsico AG](#)⁵, [Di Sabatino A](#)⁶, [Belliato M](#)⁷, [Calvi M](#)⁸, [Iacona I](#)⁸, [Grugetti G](#)⁹, [Bonadeo E](#)¹⁰, [Muzzi A](#)¹⁰, [Cereda E](#)³.

Abstract

OBJECTIVES:

Beginning in December 2019, the 2019 novel coronavirus disease (COVID-19) has caused a pneumonia epidemic that began in Wuhan, China, and is rapidly spreading throughout the whole world. Italy is the hardest hit country after China. Considering the deleterious consequences of malnutrition, which certainly can affect patients with COVID-19, the aim of this article is to present a pragmatic protocol for early nutritional supplementation of non-critically ill patients hospitalized for COVID-19 disease. It is based on the observation that most patients present at admission with severe inflammation and anorexia leading to a drastic reduction of food intake, and that a substantial percentage develops respiratory failure requiring non-invasive ventilation or even continuous positive airway pressure.

METHODS:

High-calorie dense diets in a variety of different consistencies with highly digestible foods and snacks are available for all patients. Oral supplementation of whey proteins as well as intravenous infusion of multivitamin, multimineral

trace elements solutions are implemented at admission. In the presence of 25-hydroxyvitamin D deficit, cholecalciferol is promptly supplied. If nutritional risk is detected, two to three bottles of protein-calorie oral nutritional supplements (ONS) are provided. If <2 bottles/d of ONS are consumed for 2 consecutive days and/or respiratory conditions are worsening, supplemental/total parenteral nutrition is prescribed.

CONCLUSION:

We are aware that our straight approach may be debatable. However, to cope with the current emergency crisis, its aim is to promptly and pragmatically implement nutritional care in patients with COVID-19, which might be overlooked despite being potentially beneficial to clinical outcomes and effective in preventing the consequences of malnutrition in this patient population.

Full paper available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7194616/pdf/main.pdf>.

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Evidence that Vitamin D Supplementation Could Reduce Risk of Influenza and COVID-19 Infections and Deaths.

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Abstract

The world is in the grip of the COVID-19 pandemic. Public health measures that can reduce the risk of infection and death in addition to quarantines are desperately needed. This article reviews the roles of vitamin D in reducing the risk of respiratory tract infections, knowledge about the epidemiology of influenza and COVID-19, and how vitamin D supplementation might be a useful measure to reduce risk. Through several mechanisms, vitamin D can reduce risk of infections. Those mechanisms include inducing cathelicidins and defensins that can lower viral replication rates and reducing concentrations of pro-inflammatory cytokines that produce the inflammation that injures the lining of the lungs, leading to pneumonia, as well as increasing concentrations of anti-inflammatory cytokines. Several observational studies and clinical trials reported that vitamin D supplementation reduced the risk of influenza, whereas others did not. Evidence supporting the role of vitamin D in reducing risk of COVID-19 includes that the outbreak occurred in winter, a time when 25-hydroxyvitamin D (25(OH)D) concentrations are lowest; that the number of cases in the Southern Hemisphere near the end of summer are low; that vitamin D deficiency has been found to contribute to acute respiratory distress syndrome; and that case-fatality rates increase with age and with chronic disease comorbidity, both of which are associated with lower 25(OH)D concentration. To reduce the risk of infection, it is recommended that people at risk of influenza and/or COVID-19 consider taking 10,000 IU/d of vitamin D₃ for a few weeks to rapidly raise 25(OH)D concentrations, followed by 5000 IU/d. The goal should be to raise 25(OH)D concentrations above 40-60 ng/mL (100-150 nmol/L). For treatment of people who become infected with COVID-19, higher vitamin D₃ doses might be useful. Randomized controlled trials and large population studies should be conducted to evaluate these recommendations.

Full text available at: <https://www.mdpi.com/2072-6643/12/4/988/htm>.

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Current status of potential therapeutic candidates for the COVID-19 crisis.

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As of April 15, 2020, the ongoing coronavirus disease 2019 (COVID-2019) pandemic has swept through 213 countries and infected more than 1,870,000 individuals, posing an unprecedented threat to international health and the economy. There is currently no specific treatment available for patients with COVID-19 infection. The lessons learned from past management of respiratory viral infections have provided insights into treating COVID-19. Numerous potential therapies, including supportive intervention, immunomodulatory agents, antiviral therapy, and convalescent plasma transfusion, have been tentatively applied in clinical settings. A number of these therapies have provided substantially curative benefits in treating patients with COVID-19 infection. Furthermore, intensive research and clinical trials are underway to assess the efficacy of existing drugs and identify potential therapeutic targets to develop new drugs for treating COVID-19. Herein, we summarize the current potential therapeutic approaches for diseases related to COVID-19 infection and introduce their mechanisms of action, safety, and effectiveness.

Full paper available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7175848/pdf/main.pdf>.

Click [here](#) for Dr. D's full information PDF on vitamin D.

Zinc

Zinc, a trace mineral, is a constituent of more than a hundred fundamentally important enzymes, so zinc deficiency has many negative effects on metabolism and almost all functions in the body.⁹⁸ As well, zinc deficiency can adversely affect the reproductive hormones adding another factor as to how it can impair athletic efforts.⁹⁹

Zinc is necessary for the immune system and is a potent inhibitor of various RNA viruses and may be beneficial for both prevention and treatment of the present COVID-19 pandemic.¹⁰⁰¹⁰¹¹⁰²¹⁰³ It's interesting that like the Covid-19 virus, zinc deficiency can result in the loss of sense of smell and taste. It's possible that zinc deficiency may contribute to these losses since zinc deficiency in humans is widespread¹⁰⁴ and athletes may be particularly prone to lower plasma zinc levels.¹⁰⁵

Exercise can lead to an increased need for certain nutrients. Problems can arise from exercise induced mineral loss, which is further enhanced by the finding that many of us don't consume adequate amounts of many essential minerals.

Studies have shown that many athletes, and female athletes in particular, consume diets that have been found to be inadequate for certain key minerals such as zinc, magnesium, copper, and iron. The

combination of strenuous exercise and compromised mineral status ultimately leads to low endurance capacity, depressed immune function, and the development of a variety of disease conditions.

Zinc deficiency is a problem with those that follow a vegan diet since deficiencies arise in not only zinc, but of vitamins B2, Niacin (B3), B12, D, iodine, calcium, potassium, selenium and vitamin B12 (**all of which are in MVM**).¹⁰⁶

One study looked at the effects of zinc deficiency on physical performance and found that low dietary zinc was associated with impaired cardiorespiratory function and impaired metabolic responses during exercise.¹⁰⁷

Zinc deficiency adversely affects protein synthesis. In one study the effects of zinc deficiency in rats, on the levels of free amino acid in urine, plasma and skin extract were investigated.¹⁰⁸ Zinc deficiency adversely affected skin protein synthesis. Especially where a deficiency may be present, supplemental zinc has resulted in an increase the secretion of growth hormone and IGF-I,¹⁰⁹ and testosterone¹¹⁰ and to raise plasma testosterone and sperm count.^{111,112}

A study looking at the effects of zinc supplementation on wrestlers found that the results obtained at the end of the study indicate that zinc supplementation (as well as several other ingredients in MVM, prevents production of free radicals by **activating the endogenous antioxidant system**.¹¹³ The authors concluded that “physiologic doses of zinc supplementation to athletes may beneficially contribute to their health and performance.”

The activation of the endogenous antioxidant system is important as it coincides with the effects of exercise, which also activates the endogenous antioxidant system and leads to endogenous antioxidants that enhance the beneficial effects of exercise on body composition and performance.

It’s been shown that there is an improvement in insulin resistance with **zinc** supplementation and that zinc is involved in controlling some of the aspects of obesity.¹¹⁴ Zinc also improves calcium metabolism and thus the beneficial effects that calcium has on fat metabolism.

A recent paper has shown that selenium and zinc are important in maintaining endogenous antioxidant activity and for benefits such as reducing cardiovascular and all-cause mortality.¹¹⁵

Magnesium

Magnesium, besides complementing the effects of calcium on bone health¹¹⁶ and obesity¹¹⁷ also has several other important functions. Magnesium deficiency, which has been on the rise in the past few decades, results in significant adverse musculoskeletal, neurological, cardiovascular, and metabolic effects.¹¹⁸

There seems to be an inverse and co-dependent effects between magnesium and stress levels. A recent study notes that “ the results suggest that stress could increase magnesium loss, causing a deficiency; and in turn, magnesium deficiency could enhance the body’s susceptibility to stress, resulting in a magnesium and stress vicious circle.”¹¹⁹

Magnesium is involved in numerous processes that affect muscle function including oxygen uptake, energy production and electrolyte balance. Low levels of magnesium promote inflammation^{120,121} and impact on the body’s ability to handle stress.¹²² These functions are useful in alleviating the release of pro-inflammatory cytokines and decreasing both insulin resistance and inappropriate cortisol secretion.

There is evidence that marginal magnesium deficiency impairs exercise performance and increases oxidative stress. As well, strenuous exercise increases urinary and sweat losses that may increase magnesium requirements.¹²³

Recent surveys have shown that a significant number of individuals are magnesium deficient based on their intake. Athletes in sports with weight classes are especially vulnerable to magnesium deficiency due to their weight loss practices. As such, in these athletes, and others who are magnesium deficient or whose levels are marginal, magnesium supplementation would have beneficial effects on exercise performance.

A recent study found that magnesium supplementation improved alactic anaerobic metabolism, even though the athletes were not magnesium deficient.¹²⁴ Another study found that magnesium supplementation increased strength performance.¹²⁵ As well, magnesium may prove effective for muscle cramps¹²⁶ and has a protective effect on muscle damage.¹²⁷

Magnesium has been shown to influence testosterone levels as well as the anabolic peptide IGF-1.¹²⁸¹²⁹ As well, magnesium has been shown to work along with zinc and B6 (both of which are present in MVM) to produce a significant anabolic effect.¹³⁰

Magnesium Aspartate and Phosphate are used instead of the less expensive and less effective magnesium oxide. For example, the aspartate salt has been shown influence testosterone levels and is the ingredient that is in ZMA, along with zinc monomethionine and B6, all of which are in MVM).

Manganese

Manganese is necessary for the metabolism of proteins and fats. It's also vital for proper immune and central nervous systems functioning, increases insulin sensitivity, has antioxidant properties, and is involved in energy metabolism.¹³¹¹³²¹³³

Manganese is a mineral that is required in small amounts to manufacture enzymes necessary for the metabolism of proteins and fats. It also supports the immune system, regulates blood sugar levels, and is involved in the production of cellular energy, reproduction, and bone growth.

Manganese supports blood clotting, aids in digestion, and as antioxidant, is a vital component of Sodium Oxide Dismutase, a large molecule that is the body's main front-line defense against damaging free radicals. Working with the B-complex vitamins, manganese help control the effects of stress while contributing to one's sense of wellbeing.

A deficiency in intake of manganese can retard growth, cause seizures, lead to poor bone formation, impair fertility, and cause birth defects. Researchers are also looking at new links between manganese deficiency and skin cancers.

Coenzyme Q10 (ubiquinone-10, CoQ10)

Coenzyme Q10 (CoQ10), a coenzyme that is ubiquitous in animals, including humans, is a lipid-soluble antioxidant and acting as an electron carrier is a key component of the mitochondrial electron transport chain for adenosine triphosphate (ATP) production.¹³⁴ It is also one of the key antioxidant nutrients that protect mitochondrial membrane lipids and proteins and mitochondrial DNA from free radical-induced oxidative damage.

As such it is necessary for proper energy metabolism. For example, myocardial CoQ₁₀ content is reduced by cardiac failure and aging. It is also reduced by statins, the popular cholesterol lowering drugs. Studies have suggested preventative supplementation of CoQ₁₀ for cardiac health and for those on statins.¹³⁵¹³⁶¹³⁷¹³⁸¹³⁹¹⁴⁰

CoQ₁₀ has been shown to decrease oxidative stress and mitochondrial damage leading to increases in mitochondrial mass in many tissues.¹⁴¹¹⁴² As well, CoQ₁₀ has been shown to affect the expression of genes involved in human cell signaling, metabolism and transport. As such since many neurodegenerative disorders, diabetes, cancer, muscular, and cardiovascular, and other chronic disease diseases have been associated with low CoQ₁₀ levels, supplementation may be beneficial in many conditions and diseases^{143144145 146147148149150151152} including alleviating intervertebral disc degeneration.¹⁵³

For example, CoQ₁₀ supplementation has been shown to have anti-aging and beneficial effects on semen parameters, fertility, testicular damage, and reproductive hormones including testosterone.¹⁵⁴¹⁵⁵¹⁵⁶¹⁵⁷¹⁵⁸¹⁵⁹¹⁶⁰¹⁶¹¹⁶² In a recent study CoQ₁₀ while not found to directly increase testosterone, CoQ₁₀ supplementation **“was found to ameliorate the reduction in testosterone induced by chemical reproductive toxicants, mainly by neutralizing the damaging effect of the generated free radicals.”**¹⁶³

CoQ₁₀ has also been shown to have beneficial effects on oxidative stress, inflammation, the immune system, and on exercise performance.¹⁶⁴¹⁶⁵¹⁶⁶¹⁶⁷¹⁶⁸¹⁶⁹¹⁷⁰¹⁷¹¹⁷²¹⁷³¹⁷⁴

CoQ₁₀ also regenerates and extends the action of vitamin E thus further protecting against membrane lipid peroxidation. Under the various forms of stress and inflammation, demand for coenzyme Q₁₀ increases which must be met by dietary intake in order to optimize mitochondrial function.

As well, it has been shown that the reduced form of CoQ₁₀ is an important physiological lipid-soluble antioxidant that scavenges free radicals generated chemically within liposomal membranes.^{175,176} It has also been shown that it reduces oxidative stress associated with strenuous exercise in rats, healthy adults and young athletes.¹⁷⁷¹⁷⁸¹⁷⁹¹⁸⁰¹⁸¹ As noted above, vitamin E and ubiquinone (both in MVM) increase physical working capacity of experimental animals.¹⁸²

Generation of free radicals and subsequent lipid peroxidation have been proposed to contribute to delayed tissue damage. One study has found that ascorbate and ubiquinol levels were decreased after trauma.¹⁸³ In this study, changes in tissue levels of ubiquinol, but not ascorbate reflected the degree of trauma. The authors suggest that ubiquinol levels may provide a useful marker of the oxidative component of the secondary injury response.

A recent study found that CoQ₁₀ supplementation **“significantly recovered mitochondrial function and concurrently decreased the generation of reactive oxygen species and lipid peroxides, inhibited the accumulation of lipid droplets and the formation of the NOD-like receptor family pyrin domain-containing three (NLRP3) inflammasome, and reduced interleukin-1 β release and cell death.”** Also, the authors concluded that their results clarified **“the causal role of CoQ₁₀ in coupling the electron transport chain with β -oxidation”**.¹⁸⁴

MVM also contains **acetyl-L-carnitine**, the acetyl form of **L-carnitine** which are interchangeable in the body. While one forms from the other and have similar effects in the body, each also has specific effects. Studies have shown that under certain conditions CoQ₁₀ plus L-carnitine and in some cases

L-carnitine alone, significantly increases total antioxidant, LH and testosterone levels as well as improving semen parameters.¹⁸⁵¹⁸⁶¹⁸⁷¹⁸⁸¹⁸⁹¹⁹⁰¹⁹¹¹⁹²¹⁹³

Astaxanthin

Astaxanthin, a powerful lipid-based antioxidant and anti-inflammatory, complements and adds to the many beneficial effects of MVM on body composition, exercise performance and overall health.

Astaxanthin has been shown to have potential to improve health, decrease morbidity, enhance exercise performance, increase fat metabolism during exercise, decrease oxidative stress and muscle injury, delay exhaustion, improve body composition, enhance recovery, prevents redox imbalances, stimulate mitochondrial biogenesis, ameliorate insulin resistance, bolster immunity, and attenuates muscle damage, heat stress, counterproductive inflammation and fibrosis induced by rigorous physical training as well as immobilization.¹⁹⁴¹⁹⁵¹⁹⁶¹⁹⁷¹⁹⁸¹⁹⁹²⁰⁰²⁰¹²⁰²²⁰³²⁰⁴²⁰⁵²⁰⁶²⁰⁷²⁰⁸²⁰⁹²¹⁰²¹¹²¹²²¹³²¹⁴²¹⁵²¹⁶²¹⁷²¹⁸²¹⁹

Some of the benefits of Astaxanthin deserve special attention. For example, astaxanthin has a protective effect on mitochondria, the cellular powerhouses that produce the energy we need to live and function optimally. Protecting the mitochondria is especially important during exercise since destructive free radical production increases almost exponentially and can damage not only the mitochondria, thus impairing energy systems, but also skeletal muscle as a whole impairing performance and recovery and increasing the chance of injury.²²⁰

But that's not all because astaxanthin, through its effects on decreasing mitochondrial damage in other parts of the body such as the testes, also increases testosterone production and thus increases the anabolic effects of exercise and has also been shown to have positive effects on sperm parameters and fertility.²²¹

Unlike some other antioxidants, astaxanthin not only has intrinsic antioxidant and anti-inflammatory properties but it also increases the endogenous production of natural antioxidant defense mechanisms such as SOD and heme oxygenase-1.²²²

As well it works synergistically with other ingredients in MVM. For example, in horses it's been shown that continuous dietary administration of astaxanthin and L-carnitine (both in MVM) attenuates exercise-induced muscle damage.²²³

Astaxanthin, along with other ingredients in MVM, are protective of the skin against ageing, diseases, UV radiation, and other factors that may lead to skin deterioration. For example, studies have found photoprotective effects in several ingredients including vitamins A, C, D3, E, selenium, lutein, astaxanthin, green tea, and grape extracts.²²⁴²²⁵²²⁶²²⁷²²⁸ All of these ingredients are in MVM, and several are also in several other supplements in my nutritional supplement lineup.

Quercetin

The bioflavonoid quercetin has been shown to have significant anti-inflammatory, antioxidative, anti-carcinogenic, anti-diabetic, and antihistaminic activity resulting in decreases of both acute and chronic inflammation and protective effects against toxins and the pro-inflammatory cytokines and inflammation-promoting pathways.^{229 230231232233234235236237238239240241242243244245246247248}

Quercetin also has immune bolstering effects and antiviral effects and as such may be useful for fighting infections including the current Covid-19 pandemic.²⁴⁹²⁵⁰²⁵¹

Several studies have shown the significant neuroprotective and anti-aging effects of quercetin.²⁵²²⁵³²⁵⁴²⁵⁵²⁵⁶²⁵⁷

Quercetin has been shown to enhance exercise/sports performance, increase mitochondrial biogenesis, decrease mitochondrial dysfunction, and thus positively affecting energy metabolism and exercise/sports performance.²⁵⁸²⁵⁹²⁶⁰²⁶¹²⁶²²⁶³²⁶⁴²⁶⁵ There is also evidence that quercetin is protective against intense exercise injury of the heart, especially ultrastructural damage and mitochondrial dysfunction.²⁶⁶

A review article concluded that there is evidence to suggest that flavonoids may be beneficial to connective tissue for several reasons, which include the limiting of inflammation and associated tissue degradation, the improvement of local circulation, as well as the promoting of a strong collagen matrix.²⁶⁷

Quercetin has favorable effects on body composition, reducing obesity and counter-productive obesity induced changes in skeletal muscle.²⁶⁸²⁶⁹²⁷⁰ The combination of quercetin and resveratrol (both in MVM – resveratrol in grape seed extract) has been shown to reduce obesity by modulation of gut microbiota.²⁷¹

Studies have found that quercetin works synergistically or additively with other anti-inflammatory and antioxidant compounds. For example, one study found that quercetin showed an increase in activity when combined with vitamin C.²⁷² The same study found that the in vitro antioxidant activity of quercetin was better than vitamin C. Quercetin has also been shown to have antimicrobial properties.²⁷³

Another study found that quercetin is even more effective for decreasing inflammation and loss of functional cells when used with high dose glucosamine.²⁷⁴

Piperine (Bioperine™ also in MVM) has been shown to enhance the beneficial effects of quercetin on stress and brain function.²⁷⁵

For all these reasons quercetin plays a prominent part in the beneficial effects that MVM has on all aspects of health, nutrition, exercise, and anti-aging.

Biotin

Biotin is a water-soluble vitamin (also known as vitamin B7) that is indispensable for normal health including acting as a cofactor for several of the carboxylases involved in insulin and glucose metabolism, fatty acid synthesis, gluconeogenesis, and branched-chain amino acid (BCAA) metabolism.²⁷⁶²⁷⁷²⁷⁸²⁷⁹²⁸⁰²⁸¹

The ketogenic phase of my diets and any ketogenic/low carb diet increases biotin bioavailability and consumption, and hence, promotes energy production by gluconeogenesis and branched-chain amino acid metabolism, which can result in biotin deficiency. A recent paper concluded that “It is suggested that individuals that consume the ketogenic diet have an increased biotin requirement.”²⁸²

A Sampling of Some Other Ingredients in MVM

Iodine

Iodine is an important ingredient in the proper functioning of thyroid hormone has been increased to almost double the level in the previous version of MVM.

Vitamin K1 (as phytonadione) and K2 (as MK-4 and MK-7)

These variants of vitamin K have been added as they have been shown to maintain normal blood coagulation, decrease bone loss, improve musculoskeletal disorders and health, benefit cardiovascular health, and supplement certain cancer treatments.²⁸³²⁸⁴²⁸⁵²⁸⁶²⁸⁷²⁸⁸²⁸⁹²⁹⁰²⁹¹²⁹² It may also have roles in mitochondrial electron transport, protein synthesis, neuroprotection and immunity.²⁹³²⁹⁴

A recent study found that combination of low vitamin D and K status was associated with increased blood pressure and a trend for greater hypertension risk.²⁹⁵ Another recent study found that insufficient K and D vitamin status increased aortic stiffness, a measure of cardiovascular disease.²⁹⁶

A similar study concluded that **“Vitamins A, B12, C, D, E, and K status (is important in evaluating cardiovascular risk, and vitamin supplementation may be an effective, individualized, and inexpensive destiffening therapy.”**²⁹⁷ All of these are in **MVM**.

Digezyme™

Digezyme™, an advanced plant enzyme complex, ensures optimal absorption of the supplement ingredients as well as helping food digestion and assimilation.²⁹⁸

Bioperine®

Bioperine®, a patented preparation of the black pepper thermogen, piperine, has demonstrated the ability to improve the absorption of several nutrients including curcumin/turmeric, CoQ10, and Resveratrol.²⁹⁹ The use of Bioperine results in less degradation of the active ingredients in MVM, thereby ensuring higher percentages get through to increase their beneficial effects.

Bioperine also has thermogenic and other properties on its own. For current information on the beneficial effects of Bioperine go to <https://www.bioperine.com/index.php/aboutbioperine>.

Betaine

Betaine, a methyl derivative of glycine, is found in sugar beet, which is the commercial source of betaine. Betaine can only be obtained through the diet or through the conversion of choline to betaine.

Betaine has been shown to improve anaerobic metabolism and body composition and exercise performance.³⁰⁰³⁰¹³⁰²³⁰³³⁰⁴³⁰⁵

Other groups of ingredients

MVM also contains several groups of ingredients not found in most multiple vitamin and mineral preparations. These ingredients add to the effectiveness of MVM, making it the most complete formula on the market today, regardless of price.

Peptides and Amino Acids such as:
<ul style="list-style-type: none">• Carnosine• Glutamine Peptides• L-Glutamic Acid• L-Lysine• N-Acetyl-L-Cysteine• Taurine
Herbal and Plant Ingredients and Extracts
<ul style="list-style-type: none">• Astragalus Root• Ginkgo Biloba Extract• Ginseng• Grape Seed Extract (containing Resveratrol)• Milk Thistle Extract• Panax Ginseng• Pine Bark Extract• Schizandra Berry Extract• Silymarin• Spirulina
Special Ingredients for improving health and metabolism
<ul style="list-style-type: none">• Betaine• Choline Bitartrate• Citrus Bioflavonoids Complex• Coenzyme Q10• Fiber (both soluble and insoluble)• Hesperidin• Inositol• Lactobacillus Acidophilus• Lecithin• Lutein• Phosphatidylcholine• Rutin
Digestive and Absorption Aids
<ul style="list-style-type: none">• Bioperine® (Black Pepper Extract (<i>Piper Nigrum</i>))• DigeZyme™ (<i>Aspergillus Oryzae</i>)

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