

## Multi Vitamin Formulations

The gender-specific men's and women's multivitamins and the nerve tissue supplement contain ingredients in a form that the body can easily use, in the recommended daily amounts. These ingredients promote the health of the heart, brain, muscle, bone and other parts of the body by giving them the nutrients they need to function properly.

This document goes into what is in each supplement, why those ingredients are present (and in what amounts) and what that particular ingredient does in the body.

All ingredients in the supplements are natural and nontoxic, and help support good health.

### Ingredient review for the Multi Vitamin Supplement

The broad-spectrum multivitamins were formulated for men and women according to the current knowledge of daily required amounts of nutrients, and the differences in need (as in iron) between men and women.

The polyphenolics, probiotics, and secondary nutrients like carnitine and ubiquinone (CoQ10) were added to help supplement the daily diet, and to help support the tissue-support supplement that it is meant to be taken along with. The focus of this section reviewing the multi-vitamin offering is to understand how these ingredients work in the body to improve overall health, and how the formula compares to the new recommended daily intake values for food and dietary supplements in the updated 21CFR section 101.9 [1].

The ingredient list and dosages for the men's and women's multivitamins are described in the table below.

Table 1: Overview of the gender specific Multi-Vitamin

<b>Ingredient</b>	<b>Men's Multi</b>	<b>Women's Multi</b>
Vitamin A- Palmitate	900mcg	900mcg
Vitamin C Ascorbic Acid	90mg	90mg
Vitamin D3 Cholecalciferol	25mcg	25mcg
Vitamin E- D-Alpha Mixed Tocopherols	22.5mg	22.5mg
Vitamin K- K2 Menaquinone-7	45mcg	45mcg
Vitamin B1- Benfotiamine	25mg	25mg
Vitamin B2- Riboflavin 5 Phosphate	60mg	60mg
Vitamin B3- Niacinamide	20mg	20mg
Vitamin B6- Pyridoxine HCL	100mg	100mg
Vitamin B9- Methylfolate	400mcg	400mcg
Vitamin B12- Methylcobalamin Pure 99%	1mg	1mg
Vitamin B7- Pure Biotin 100%	300mcg	300mcg
Vitamin B5- Calcium Pantothenic Acid	5mg	5mg
Phosphorus	150mcg	150mcg
Iodine (Potassium Iodine)	100mcg	100mcg
Chromium Picolinate	200mcg	200mcg
Zinc Citrate 31%	60mg	60mg

TRAAC® Manganese Bisglycinate Chelate	4mg	4mg
Selenium (Sodium Selenate 50% L-Selenomethionine 50%)	200mcg	200mcg
TRAAC® Molybdenum Glycinate Chelate	120mcg	120mcg
Calcium Carbonate Powder	400mg	400mg
Magnesium (as oxide)	400mg	400mg
Iron (Ferrous Fumarate)	N/A	18mg
<b>Antioxidant Blend</b>		
Cranberry (fruit)	100mg	100mg
Garlic Powder	75mg	50mg
Ginger (Organic)	50mg	50mg
Grape Seed Extract 98%	60mg	60mg
Pine Bark 50%	60mg	60mg
Probiotic Blend	10 billion CFU	10 billion CFU
Enzyme Blend 6 Strains	40mg	40mg
<b>Heart Blend</b>		
CoQ10 (Microactive)	10mg	10mg
L-Carnitine	75mg	75mg
D-Ribose	120mg	120mg
Resveratrol 50%	60mg	60mg
Lycopene	1mg	1mg

Inactive ingredients: Stearates

Serving Size- 3

### Benefits by Nutrient:

#### Vitamin K- K2 -- Menaquinone-7

Vitamin K2 was first described as a byproduct of fermented soybeans and is involved in bone health [2]. MK4 and MK7 are the most common versions of this vitamin. Their required daily doses are: MK4 at 45mg/day and MK7 at 45mcg/day.

While both are a normal part of the diet, MK7 is used in this supplement because it is converted to Vitamin K1 in the colon, is better able to be absorbed in the body, and results in increased benefits to health [3, 4].

#### Vitamin B1- Benfotiamine

When supplemented into the diet, benfotiamine is converted to its active form of vitamin B1 (thiamine diphosphate), and has been shown in studies to help promote weight loss, urinary health, improve mood, and support cognition. Studies show that supplementation with benfotiamine greatly increases the levels of B vitamins in the bloodstream, and the benefits received [5].

#### Activated B Vitamins - Riboflavin 5 Phosphate, Methylfolate, and Methylcobalamin

Other B vitamins are included in the multi are riboflavin 5 phosphate, methylfolate and methylcobalamin. These are already activated, meaning they don't need to be converted by the body. These typically are compounds that are either phosphorylated or methylated.

Riboflavin 5 phosphate, the activated form of vitamin B2, also known simply as riboflavin, is a precursor to (the starting point for) flavin adenine dinucleotide (FAD) and flavin mononucleotide (FMN,) enzymes that are important to the energy cycle of cells [6].

Methylated folates (Vitamin B9), and methylcobolamin (Vitamin B12) are involved in the methylation cycle, which effects neurotransmitter metabolism (a vital part of the health of the nervous system,) homocysteine metabolism (which is involved in cardiovascular health and general wellness), and the body's production of glutathione (by regulating the metabolism of sulfur amino acids), a powerful antioxidant (Fig 1.)

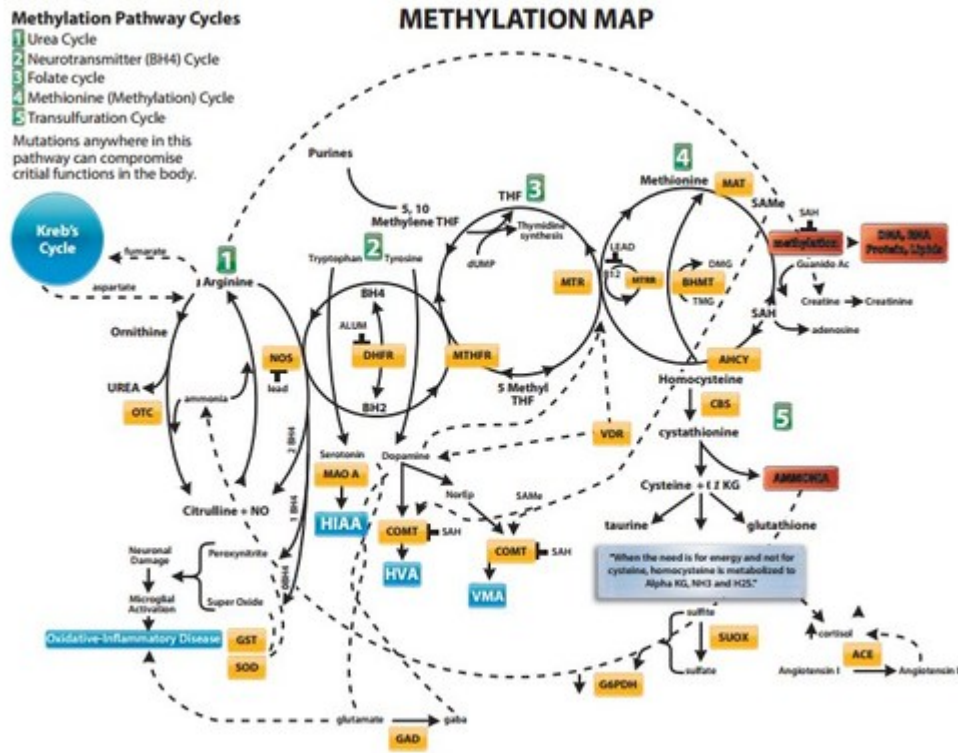


Figure 1: Detailed methylation map

In studies in women on prenatal support, use of high doses of methylcobolamin (Vitamin B12) was more effective than other prenatal vitamin supplementation, reducing neuroblast anemia in these women [7, 8, 9].

When there is not enough Vitamin B12 in the body, the effect of methylfolate supplements is reduced because the body isn't able to convert them into usable forms fast enough. This is known as "methylfolate trapping." Taking active Vitamin B12 with other methylfolates (such as Vitamin B9) ensures that there is enough Vitamin B12 for the body to use, and makes the supplement more effective [10].

**Chelated Minerals: TRAAC® Manganese Bisglycinate and TRAAC® Molybdenum Glycinate**  
 TRAAC® minerals are amino acid chelates (compounds that trap, neutralize, and allow the body to remove certain minerals) that are produced by industry leader, Albion Minerals. The chelated material is reviewed with a special process called FT-IR, instead of the more common industry standard of NIR. This verifies that the complete chemical reaction for the mineral chelate has occurred [11]. These mineral chelates have been certified as a safe option that is easily absorbed and used by the body. The elements molybdenum and manganese are important parts of these chelation compounds.

Molybdenum is part of the important enzymes xanthine oxidase and sulfite oxidase, which break down and clear minerals and toxins. It is also an important co-factor in numerous other clearance pathways [12].

Manganese helps a mitochondrial antioxidant, superoxide dismutase, protect the mitochondria – the “power plants” of the cell. Because mitochondria produce free oxygen radicals, and are very susceptible to oxidative stress and damage, this antioxidant (and the manganese that works with it) are extremely important [13].

#### Chromium Picolinate

Chromium picolinate is a common source of chromium supplementation, providing the small amounts of chromium (trivalent chromium) that the body needs [14]. Chromium supplements help lower blood sugar and cholesterol levels, improving overall health. While there are many forms of chromium, most forms are absorbable. To date, only Chromium oxide has been shown to be less usable by the body than the others [15].

#### L-Selenomethionine

Organic forms of selenium have been shown in animals to improve selenium and antioxidant levels in the body [16]. However, certain individuals with hepatic burden (liver problems) may not be able to turn organic selenium into the more usable elemental selenium. This decreases the amount of selenoproteins, an important metabolic substance, in the body.

In a randomized trial of people with mild to moderate fibrosis of the liver, selenium levels in the supplemented cohort only rose with sodium selenite (inorganic selenium) and not the typical organic forms [17].

To ensure that selenium levels are at healthy amounts in the body regardless of liver function, both organic and inorganic selenium are included in the multi-vitamin supplements.

#### Ferrous Fumarate

This iron-containing chelated mineral has been in circulation as a dietary supplement ingredient as well as a global food fortification ingredient for quite some time. It works better as a constipation (compacted stool) aid than iron sulfate and may be better absorbed by the body when taken along with vitamin C (ascorbic acid) [18].

#### Microactive CoQ10

CoQ10, also known as ubiquinone or ubiquinol (depending on the redox state,) is a potent antioxidant, protecting cells from damage. It also is a part of the the electron transport chain, an important part of cell function.

CoQ10 is generally difficult to take in because of its crystalline structure. However, this form -- Microactive CoQ10 -- has been processed in a way that helps increase its solubility and allows the body to absorb more of it. Studies have shown that this processing doubles the levels of CoQ10 in the bloodstream [19].

## Ingredient Review for the Nerve/tissue Support Formula

The current formulation for the nerve/tissue support formula is a blend of nutrients and botanicals (chemicals from plants), as listed in the table below. These nutrients support the health and function of the nervous system, as well as the cartilage, ligaments, and tendons. These nutrients also support cardiometabolic (heart and lung) and reproductive health. This product has been formulated to be beneficial for both men and women.

Table 2: Supplement Formulation

Ingredient	Amount per serving
Revised Alpha Lipoic Acid (Sodium)	300mg R-LA
Turmeric Extract (SE 95% Curcuminoids)	150mg
Ashwagandha Powder	200mg
Hyaluronic Acid	50mg
Green Tea 50% ECGC	300mg
Para-aminobenzoic acid (PABA)	500mg

Inactive ingredients: Stearates

Serving Size 3

### Health Support of the Nerve/tissue Support Formula by System

Nervous tissue – Ingredients involved: RLA, CoQ10 (Microactive), L-Carnitine, D-Ribose, Resveratrol, Ashwagandha

The ingredients listed above improve normal nerve function through neuroprotection (protecting neurons,) neuro-antioxidant activity (preventing damage to neurons by removing oxidizing/damaging chemicals,) and supporting normal cognitive (thought, learning, and problem solving) and memory health.

R-lipoic acid is the “poster child” for supporting the nervous system. It stimulates the nervous system to produce glutathione, an important antioxidant [20, 21]. Antioxidants prevent and help repair damage caused by oxidants, also known as free oxygen radicals, which are produced as waste products by cells. Left unchecked, oxidation can play a part in memory loss, cognitive declines, eyesight issues, and other problems that are often associated with aging. Therefore, antioxidants are important in supporting overall health.

Alpha-lipoic acid is a nutrient that is very important to the nervous system. When given as a supplement, alpha-lipoic acid improved sensory symptoms (sight, hearing, and so on) as well as cognition and memory [22-25]. There is also clinical data implying that it helps with carpal tunnel syndrome as well [26].

In conditions associated with cognitive and memory deficits, lipoic acid (a slightly different nutrient) has been shown to improve cognitive function [27]. The largest of the effects have been seen in individuals with mild dementia, where it slows the decline in function that is usually seen in these patients [28].

Coenzyme Q10 is another antioxidant that is known to have numerous roles within the body, including in the nervous system. In a study of diabetic neuropathy (pain), Coq10 supplementation was found to be effective in improving nerve conduction, and reducing pain and impairment [29]. In fibromyalgia, a

condition linked with central sensitization of pain pathways, CoQ10 was found to play a role in reducing pain levels and helped support physical fitness levels as well as overall health [30].

D- Ribose has also been shown to support neurological function in fibromyalgia, improving sleep and energy while decreasing pain [31]. In a related disorder, chronic fatigue syndrome, or myalgic encephalomyelitis, L-Carnitine supplementation shows some results as well [32].

Resveratrol, a substance best known for its presence in red wine and other fruits, was shown in one study to increase memory in healthy aging adults. In particular, it improved activity and connection in the hippocampus, the part of the brain responsible for memory [33].

Ashwagandha, an herb used in Ayurvedic medicine, has been associated with significant improvements in executive function, sustained attention, and information processing [34].

Working together, these nutrients improve cognition, memory, and neuron growth.

### Musculoskeletal - Ingredients: Magnesium, Turmeric Extract, Hyaluronic Acid, Vitamin D, Ashwagandha

These ingredients improve muscle strength, recovery after injury, and bone and joint health.

For muscle health and strength in particular, the key players are magnesium and vitamin D. In women, magnesium has been shown to improve skeletal muscle power, and help reduce hs-CRP (a marker of inflammation) [35]. Magnesium in both aging men and women has been shown to protect bone and muscle mass, which can decline naturally with aging [36].

Vitamin D is associated with higher muscle strength in men and women [37]. Furthermore, vitamin D is crucial in maintaining muscle, bone, cartilage, and joint health as we age. It is recommended by groups like the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO), that postmenopausal women take in at least 20mcg of D3 a day [38]. This can be achieved through outdoor activity (vitamin D is produced in the skin when exposed to sunlight), but supplementation through diet helps ensure that enough of this vitamin is absorbed into the body.

The Ayurvedic herb ashwagandha has interesting data showing its support of the muscular and skeletal system. In an 8-week strength trial, ashwagandha was shown to promote both muscle strength and muscle recovery [39].

For joint support, turmeric and hyaluronic acid both have data to suggest that they help combat pain and joint mobility issues associated with osteoarthritis.

Extracts from the Turmeric plant (*Curcuma longa*), a relative of ginger, inhibits NF-kB, a protein that controls the transcription of DNA, the immune system, and how the body responds to stress. When NF-kB isn't regulated properly, it can be linked to cancer, inflammation, autoimmune disease, and infection – turmeric helps to keep this under control [40]. Turmeric has also been shown to help prevent the degradation of cartilage, promoting joint health [41].

Hyaluronic acid also helps to regulate the immune response by binding to the surface of cell membranes, particularly cartilage, and has been shown to help reduce inflammation in the joints [42]. Both ingredients have been shown to be effective in multiple clinical trials [43, 44].

Cardiometabolic - Ingredients: Green Tea Extract, Lycopene, Garlic, CoQ10 (Microactive), L-Carnitine, Probiotic Blend, B vitamins, Chromium, Ribose

These ingredients support normal heart, lung, and metabolism function, which includes blood glucose control, the natural breakdown of key substances, hepatic (liver) function, and vascular (breathing) and cardiac (heart and blood flow) support.

Cardiovascular health and the body's metabolism are linked. Over the years, there has been a steady increase in related diseases: Cardiovascular disease, Type 2 diabetes, non-alcoholic fatty liver disorder, and obesity. This increase is due to many causes – diet, pollutants in the environment, and changes in exercise. Oxidative stress is also part of the cause.

One generator of oxidative stress can be the bloodstream amino acid homocysteine [45]. High levels of this chemical increases the risk of cardiovascular disease. B vitamin supplementation helps the body break down homocysteine and naturally reduce its level in the bloodstream [46].

Lipid (fats) and blood sugar levels can also increase oxidative stress. Increased levels in the blood, especially low or very low-density lipoproteins, can increase the risks for heart disease. This is because these lipoproteins can become damaged through oxidization and form the building blocks for atherosclerosis – the hardening and clogging of arteries. Green tea extract has been shown to help balance lipid levels, reduce sugar levels in the bloodstream, and reduce the markers of inflammation (such as iron) in individuals that are overweight [51, 52].

Supplemental chromium use also supports blood-sugar control [53, 54] In addition, it may reduce stress-eating by improving serotonin (a nervous system chemical) metabolism in the central nervous system [55]. Stress-eating contributes to high levels of lipids and sugars in the blood stream and is implicated in a wide range of health problems.

Probiotics – the ingestion of beneficial bacteria to support their presence in the gut – have been shown to reduce lipid levels in the blood stream and oxidative stress [56, 57]. Their mechanism of action is as yet unclear – and may be on multiple levels, including nutrient production and better digestion – but the metabolism of bile salts may be a part of it.

Antioxidants in the bloodstream reduce damage from oxidation and have been shown to help maintain normal blood pressure and circulatory system health. Lycopene and ubiquinone (CoQ10) are antioxidants that have been shown to reduce both systolic and diastolic blood pressure significantly, in clinical trials [47, 48, 49, 50].

Lastly, D-ribose and L-carnitine are nutrients that play a role in supporting blood vessel expansion. They help prevent blood vessels from collapsing and closing, which helps keep blood flowing to the heart even during ischemia (blood vessel blockage caused by atherosclerosis). In coronary heart disease, D-Ribose was shown to be significantly helpful in supporting the prevention of heart attacks [58]. Because



it improves blood flow, L-carnitine was shown to increase walking distance capabilities in some studies [59, 60].

Men's Health - Ingredients: Ashwagandha Powder, Para-aminobenzoic acid (PABA), Grape Seed Extract, Pine Bark, CoQ10 (Microactive), L-Carnitine, Lycopene.

These ingredients support prostate function, sexual function, and general genitourinary tract support in men.

Grape seed extract has been shown to help reduce the risk of prostate cancer in aging men by 41% by helping support proper hormone production and reducing oxidative stress and damage to the prostate [61]. Lycopene has also been shown in studies to help reduce the risk of prostate cancer through its action as an antioxidant [62, 63].

Pine bark extract has been shown to reduce prostate size (and the accompanying erectile dysfunction and lower urinary tract symptoms) in several studies [64].

PABA (para-aminobenzoic acid or vitamin B-x), a naturally occurring chemical found in green, leafy vegetables, and ubiquinone (CoQ10), an antioxidant, help support healthy penis structure. These ingredients have been studied for their ability to support a reduction in Peyronie's disease, an underreported, connective tissue disorder resulting in abnormal curvature of the penis, erectile dysfunction, and painful intercourse [65, 66, 67]

Ashwaganda and L-carnitine have been shown to improve semen quality in men through reducing oxidation, improving mitochondrial function (energy production), and supporting proper sex hormone function. This supplementation is very important, as semen quality is a growing issue in the US and other Westernized countries, with as much as a 50% measured reduction in sperm count [68, 69, 70, 71].

Men's health problems are often underreported due to social and psychological pressures, but are no less important. Supplementation with these nutrients can help.

Gender Specific Health (Women)-Ingredients: CoQ10, Lycopene, Ashwagandha

These ingredients help to support women's health, including ovary function, sexual function, and general genitourinary tract support.

Carotenoids, including lycopene, are broad-spectrum antioxidants that are highly beneficial in aging women. They prevent damage from free oxygen radicals [62, 63]. In post-menopausal women, carotenoid supplements have been shown to significantly reduce oxidative stress [72], help with healthy aging and promote a reduced risk of chronic disease.

Ashwagandha herb powder is not an aphrodisiac, but supplementation supports normal sexual arousal, lubrication, orgasm, and satisfaction in older women. It also reduced sexual distress and increased the number of successful sexual encounters [73].



Ubiquinone (CoQ10) combats oxidative stress in the ovaries, a main cause of ovarian aging and loss of hormone production and fertility (including menopause symptoms and related problems with cognition) [74]. CoQ10 use has been shown to restore oocyte function – the production and readying of new egg cells – and to increase fertility [75]. This antioxidant may also help maintain proper immune system function, preventing pregnancy loss [76, 77].

### Review of Nutrient Amounts vs Current RDI Values

As of 2018, nutrient labels will be forced to change. This is part of an effort to decrease the practice of “fairy dusting” supplements with low amounts of nutrients so that they can be claimed on a label even if that ingredient is not in amounts large enough to produce an effect. Because “fairy dusting” is bad for consumers, changing the labelling practice helps to ensure better, more accurate labeling and better value for the consumer. A few of the requirements of this new labeling are:

- Column B2 ingredients now include Potassium, Vitamin D, Calcium, and Iron levels.
- If the supplementation has 2% or greater of the %DV (the percent daily value,) then it MUST be added to the label. Otherwise, it is excluded from the label completely [1].
- Other nutrients not in the vitamin B2 area should also follow suit.

In the Table below, the daily values (RDI) of each ingredient, and the amounts of each in the supplements, are compared. The nutrients in the multivitamins is equal to or greater than the values for adults and children over four years. MK7 is the exception, being lower than the RDI for Vitamin K, but does have significant health benefit data at the dose provided (45mcg/ day).

*Table 3: Amount of nutrient in the Multi Core vs. the RDI for Adults and Children Four and Up.*

Nutrient	Unit of measure	RDI	
		Adults and children =4 years	Multivitamin Core
Vitamin A	Micrograms RAE (mcg)	900	900
Vitamin C	Milligrams (mg)	90	90
Iron	Milligrams (mg)	18	18
Vitamin D	Micrograms (mcg)	20	25
Vitamin E	Milligrams (mg)	15	22.5

Vitamin K	Micrograms (mcg)	120	45*
Thiamin	Milligrams (mg)	1.2	25
Riboflavin	Milligrams (mg)	1.3	60
Niacin	Milligrams NE (mg)	16	20
Vitamin B6	Milligrams (mg)	1.7	100
Folate	Micrograms DFE (mcg)	400	400
Vitamin B12	Micrograms (mcg)	2.4	1,000
Biotin	Micrograms (mcg)	30	300
Pantothenic acid	Milligrams (mg)	5	5
Iodine	Micrograms (mcg)	150	100
Magnesium	Milligrams (mg)	420	400
Zinc	Milligrams (mg)	11	60
Selenium	Micrograms (mcg)	55	200
Manganese	Milligrams (mg)	2.3	4
Chromium	Micrograms (mcg)	35	200

Molybdenum	Micrograms (mcg)	45	120
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\* = Clinical relevant dose. RDI does not represent accurately the use of MK7 as a Vitamin K source.

## Conclusions

The multivitamin core has been formulated to meet or exceed the RDI for most nutrients listed in the new updates to nutrition labeling practices. The forms and amounts of each ingredient were carefully considered to ensure that the body would absorb each nutrient as well as possible. There is no evidence of fairy dusting practices within the formulation, so for both nutrient type and the nutrient amount there is a consistent quality to the formulation.

Together, the multivitamin and the nerve/tissue support product promote the health of men and women by giving the heart, brain, muscles, bones and other parts of the body the nutrients they need to function properly.

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