

AstaMed MYO™

A prescription medical food intended for the clinical dietary management of sarcopenia.

Dispensed by Prescription
60 Softgel Capsules
Product Code: 867754000164

RECOMMENDED USE

AstaMed MYO™ is supplied in oval, softgel capsules and is administered orally. It is dispensed by prescription, and is to be administered only under the supervision of a physician. It is intended for the clinical dietary management of sarcopenia. The daily recommendation for adults is two (2) softgel capsules taken together after a meal, or as directed by your physician.

It should not be taken by individuals with known allergies or sensitivity to any of the ingredients in AstaMed MYO™.

Women who are pregnant or nursing should consult their physician prior to taking AstaMed MYO™.

PRODUCT DESCRIPTION

Dietary Ingredients

AstaMed MYO™ is a specially formulated medical food to meet the distinctive nutritional requirements of sarcopenia. Specifically, it is designed to address the needs of related to deficiency of antioxidants and vitamin D that cannot be met by modifications to the diet alone. AstaMed MYO™ contains 6 mg of a proprietary form of natural astaxanthin (AstaReal® Haematococcus pluvialis algae extract), 5 mg tocotrienol (palm fruit oil extract), 3 mg zinc (zinc gluconate, dihydrate), and 7.5 mcg Vitamin D3 (cholesterol from wool grease -lanolin) per softgel capsule. Two softgel capsules supply the daily amount.

Other Ingredients

AstaMed MYO™ contains Non-GMO modified cornstarch, carrageenan, glycerin, sorbitol, purified water, extra virgin olive oil, and palm stearin.

How Supplied

AstaMed MYO™ is supplied as soft-gelatin capsules filled with the ingredients. Only the ingredients manufactured according to Current Good Manufacturing Practices (cGMP) are used. The product is manufactured in a Food and Drug Administration (FDA) registered food facility according to CGMP.

BACKGROUND

Sarcopenia is defined as the progressive loss of muscle mass or quality characterized by a decline in muscle strength and/or performance. A review of scientific and medical literature identifies that while the causes and mechanism of sarcopenia are not completely resolved, inadequate nutrition and exercise are known to influence the metabolic imbalance of proteins in skeletal muscle. In particular, inadequate nutrition can worsen the dysfunction of the musculoskeletal system and, consequently, worsen the characteristic symptoms of sarcopenia.

In 2010, the European Working Group on Sarcopenia in Older People (EWG SOP) officially defined sarcopenia as a syndrome characterized by the progressive loss of skeletal muscle mass and quality, leading to deterioration in muscle function (strength or performance) and a risk of physical disability, poor quality of life, or death. The triad of weakness, difficulty walking, and fragility has been recognized as syndromic. Study groups have emphasized the importance of the clinical features of this triad in the diagnosis of sarcopenia and, therefore, of the clinical examination. An expanded definition based on clinical markers is also beginning to emerge.

The term "sarcopenia" has two meanings. In the narrow sense, it refers to the syndrome of loss of muscle mass or quality most commonly seen in patients over the age of 65. In a broader sense, it refers to the loss of muscle mass or quality for any reason, not necessarily (or merely) associated with the elderly, but corresponding to the triad of weakness, difficulty walking, and fragility. The EWG SOP differentiated primary, or age-related, sarcopenia from secondary sarcopenia associated with cachexia, weight loss, cancer or other systematic disorders, malabsorption syndromes (e.g., of protein), and disuse. Sarcopenia can occur in populations other than in the elderly. It is neither a necessary nor an inevitable part of the aging process. Like most chronic diseases, however, the risk of sarcopenia increases greatly with age. In this package insert, we use the term "sarcopenia" to refer to primary sarcopenia, a disease or abnormal condition (beyond normal age-related gradual muscle loss), with declined muscle strength or/and physical performance, to the point at which it significantly contributes to functional decline, increased frailty, and a poor quality of life.

Deficiency of Vitamin D impairs protein synthesis, both directly and indirectly. Inadequate intake of antioxidants leads to oxidative damage to proteins, lipids and nucleic acids, alters cell-signaling pathways and promotes mitochondrial dysfunction, which also results in imbalance of protein metabolism in skeletal muscle. It is important for the patient to have adequate amounts of each of these dietary components for the dietary management of sarcopenia. In addition, it is also important for the medical intervention product to provide an efficacious combination of antioxidants with optimal targeted effects.

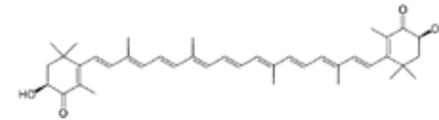
While diet as a whole is important in the management of sarcopenia, specific components of the diet, specially designed to optimize the metabolic balance between muscle anabolism and catabolism, are of particular significance. It is very difficult, if not impossible, to achieve the proper management of patients with sarcopenia through modifications to the diet alone. Scientific evidence describes two major weaknesses of managing sarcopenia via change in diet alone. First, the older patient population of patients with sarcopenia (aged 55 and older) may have characteristic problems metabolizing protein and protein anabolism due to the aging process alone, and as a result of sarcopenia. Second, for all patients with sarcopenia, it is difficult to overcome deficiencies of Vitamin D and antioxidants by changes in diet, both with respect to quantity consumed and efficacious formulation or combination with other necessary nutrients.

AstaMed MYO™ is a medical food specially formulated to address the dietary management of sarcopenia. It meets the distinctive nutritional requirements of patients with sarcopenia, which include deficiencies of antioxidants and Vitamin D. Such deficiencies lead to an imbalance of protein metabolism, and a decline in the quality and function of protein in skeletal muscle.

Natural Astaxanthin

Astaxanthin is a xanthophyll carotenoid found in various microorganisms and marine animals. AstaMed MYO™ is derived from the extract of Haematococcus pluvialis algae, and containing constituents of astaxanthin esters as natural astaxanthin. Natural astaxanthin (a proprietary ingredient of AstaReal®) is a naturally occurring carotenoid with a unique molecular structure that spans the double layer of the cell membrane. Astaxanthin is therefore exposed inside and outside of the cell. Due to the unique molecular structure of astaxanthin, it is capable of exerting strong antioxidant activity in the cell membranes and on mitochondria. The use of natural astaxanthin for sarcopenia is patented under the issued US patent 6245818 B1, and is claimed under another pending patent. The strong anti-oxidative capability of astaxanthin has been shown to scavenge peroxy radicals and quench singlet oxygen, thereby inhibiting the damage of proteins, lipids and DNA, and preventing a negative cycle of lipid peroxidation chain reaction.

The structural formula for Astaxanthin is as follows

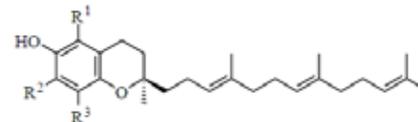


The molecular weight of astaxanthin is 596.8 g/mol. It has a molecular formula of C₄₀H₅₂O₄.

Tocotrienol

AstaMed MYO™ contains tocotrienol-rich fractions derived from palm oil as natural tocotrienols. Tocotrienols are members of a vitamin E family, and are known to have effective antioxidant capabilities as a function of their ability to donate a hydrogen atom to reactive oxygen species (ROS). Tocotrienols are also known to produce a synergistic effect on natural astaxanthin antioxidant function.

The structural formula for α-tocotrienol is as follows:

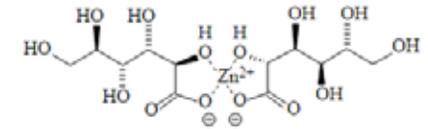


The molecular weight of α-tocotrienol is 424.66 g/mol. It has a molecular formula of C₂₉H₄₄O₂.

Zinc

AstaMed MYO™ contains zinc in the form of zinc gluconate. Zinc gluconate is a naturally occurring zinc salt of gluconic acid, and is known for its ability to provide zinc supplementation. Zinc is also an appetite stimulator. Zinc functions through orexigenic peptides coupled to the afferent vagus nerve. Additionally, zinc is a cofactor of superoxide dismutase-1 (SOD1) in the cytoplasm. Intake of zinc is believed to enhance the function of SOD1, which leads to improved internal antioxidant capabilities, in order to counter increased ROS levels in sarcopenia.

The structural formula of zinc gluconate is as follows:



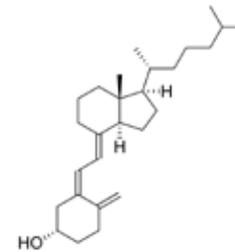
The molecular weight of zinc gluconate is 491.72 g/mol. It has a molecular formula of C₁₂H₂₂O₁₄Zn 2H₂O.

Vitamin D3

AstaMed MYO™ contains 7.5 mcg Vitamin D3 per softgel capsule, with a dose of two softgel capsules per day. Thus, the formulation is optimized to provide a consistent total daily delivery of 600 IU daily, which conforms to the recommendations of the Institute of Medicine. This amount is sufficient to reduce the risk of fractures in the elderly together, with concomitant risks of related morbidities in patients with sarcopenia.

A significant study of elderly subjects shows a positive effect of Vitamin D3 supplementation through improvement in musculoskeletal function and the reduction of falls. This is particularly important in sarcopenia patients who qualify as frail.

The structural formula of Vitamin D3 is as follows:



The molecular weight of Vitamin D3 is 384.6 g/mol. It has a molecular formula of C₂₇H₄₄O.

Medical Food

A medical food is a FDA-regulated product category defined by the Congress in amendments of the Orphan Drug Act of 1988. See Statutory Definition at Title 21 U.S. Code (U.S.C.) section 360ee(b)(3). A medical food is a medical product with food-based ingredients specially formulated to be consumed or administered orally or enterally. A medical food is intended for the dietary management of a disease or condition for which distinctive nutritional requirements are established based on recognized scientific principles and medical evaluation. A medical food is intended for use under medical supervision.

Physical Description

AstaMed MYO™ is a specially formulated medical food containing natural astaxanthin, tocotrienol, zinc, and Vitamin D3 in dark red soft gelatin capsules supplied in labeled, lightproof plastic bottles. The soft gelatin capsules are intended for oral administration and contain 6 mg of a proprietary form of natural astaxanthin (AstaReal® Haematococcus pluvialis algae extract), 5 mg tocotrienol (palm oil extract), 3 mg zinc (zinc gluconate), and 300 IU Vitamin D3 per soft gelatin capsule. The dose or serving size is 2 softgel capsules.

PHARMACOLOGY OF AstaMed MYO™

Mechanism of Action

AstaMed MYO™ is intended to restore physiological levels of antioxidants and Vitamin D3 in patients with sarcopenia. The relationship of diet and nutritional factors on the prevalence of muscle loss, namely sarcopenia, has been widely studied. In particular, inadequate nutrition can worsen the dysfunction of the musculoskeletal system, and consequently, can worsen the characteristic symptoms of sarcopenia.

Although the causes and underlying mechanisms of sarcopenia are not fully understood, evidence pointing to the genomic, proteomic and metabolomic mechanisms is accumulating. Studies have identified a number of factors contributing to the progressive loss of muscle mass or quality (beyond merely the age-related processes), including: alterations in normal skeletal muscle, alterations in normal cell turnover in skeletal muscle, degeneration at the neuromuscular junction, dysfunction at the level of myosatellite cells, altered, slower protein turnover, endocrine abnormalities, and mitochondrial dysfunction.

Abnormalities in the process of protein regulation and cellular turnover in skeletal muscle are both associated with sarcopenia (loss of muscle mass and quality). Loss of muscle mass and quality most likely result from an imbalance of protein metabolism. This imbalance, in turn, results from decreased protein synthesis and increased protein degeneration, and causes an imbalance of muscle anabolism and catabolism.

Suboptimal nutrition and physical inactivity both contribute to decreased protein synthesis and other forms of metabolic imbalance. Elevated levels of ROS and chronic inflammation during aging, moreover, make it more difficult for the sarcopenia patient to meet adequate dietary and nutritional needs because higher amounts and more efficacious combinations of antioxidants are needed.

The scientific literature documents that antioxidants may constitute a necessary element for the management of sarcopenia. The use of antioxidants to reduce ROS levels has been widely advocated, and is well established. Antioxidants can have a direct, positive effect on protein synthesis signaling pathways and mitochondrial oxidation. However, the choice of the correct antioxidants is vital. A sole antioxidant or some combinations of antioxidants may have paradoxically pro-oxidant effects under conditions of strong oxidative stress. Therefore, it is critical that the combination of antioxidants has optimal targeted effects, is stable, and resists conversion to pro-oxidants. AstaReal® patented natural form of astaxanthin meets these parameters.

Vitamin D is associated with protein quality and synthesis in skeletal muscle. The mechanism is mediated both directly, via activation of the Vitamin D receptor (VDR) on muscle cells, and indirectly, involving calcium. In addition, the VDR is known to play a role in modulating intramuscular inflammation by mediating interleukin (IL)-6.

Elderly patients with sarcopenia often exhibit Vitamin D deficiency, both because of inadequate intake, and because of a reduced ability to synthesize Vitamin D internally. A deficiency in Vitamin D may result in decreased protein synthesis and increased protein degradation in the skeletal muscle, leading to decreased muscle mass or quality. Vitamin D deficiency may contribute to disability and lack of functionality in patients with sarcopenia in other ways as well.

The optimal clinical management of sarcopenia cannot be addressed through dietary modification alone. Adequate amounts of

antioxidants and Vitamin D in the right form are required to restore the metabolic imbalance of protein in the skeletal muscle. AstaMed MYO™ offers a special formulation of specific antioxidants (astaxanthin, tocotrienol, and zinc) and Vitamin D designed to meet the distinctive nutritional requirements of sarcopenia. AstaMed MYO™ is intended to restore homeostasis as part of the clinical management of sarcopenia.

AstaMed MYO™ formulation

A prime advantage of astaxanthin is its stability as an antioxidant. It is difficult to convert astaxanthin into a pro-oxidant even under strong oxidative conditions. The correct mixture of antioxidants is even more difficult to be converted into pro-oxidants than is a single antioxidant. The mixture of astaxanthin with tocotrienols not only interferes with conversion into pro-oxidants, but also produces a synergistic effect on natural astaxanthin antioxidant function.

Zinc is recognized as a cofactor of SOD1, which is an enzyme that catalyzes dismutation of superoxide radicals into oxygen or hydrogen peroxides. Zinc may have positive effects in sarcopenia by promoting the expression of SOD1 and, in consequence, enhance intracellular antioxidant capacity. Zinc also acts as an appetite stimulator and overcomes the anorexia that can characterize the population prone to sarcopenia.

Vitamin D3 activates the VDR that is tightly linked to increased protein synthesis in skeletal muscle cells. Vitamin D is also associated with the calcium channel, which indirectly exerts positive influence on protein metabolism. Vitamin D reduces the risk of bone fracture in elderly and frail patients, including those with sarcopenia.

CLINICAL STUDY EXPERIENCE

The effectiveness of AstaMed MYO™ formula (astaxanthin 12mg, tocotrienols 10mg, and zinc 6mg per day) were assessed in a randomized, placebo-controlled, double-blind study of 41 adult subjects (65-82 year old) with declined muscle function. The subjects undertook 1 month of the AstaMed MYO™ formula or the placebo followed by 3 months of exercise training (high intensity interval training using an interval treadmill incline protocol, a 85% HRmax target, 3x/week for 40-60 minutes) with the AstaMed MYO™ formula or the placebo. Tibialis anterior muscle strength and endurance were assessed by isometric dorsiflexion of the foot using a ramp protocol to fatigue. Treadmill and 6-minute walking tests were also performed before and after training. As of the 1 month, muscle maximal strength (MVC) was significantly improved at more than 10% in a sub-group of the subjects with severely declined muscle function only in the AstaMed MYO™ formula group. After the 4 months, muscle maximal strength and the cross sectional area increased by 14.7% (p<0.05) and 2.68% (p<0.05) only in the AstaMed MYO™ formula group. Significant improvements in endurance were also found as measured by 50.6% (p<0.05) and 45.8% (p<0.05) increases of total contractions and total time force integral only in the AstaMed MYO™ formula group. Both groups showed significant improvements to the baselines in treadmill exercise time and 6 minute walking distance, although better trends in those performances of the AstaMed MYO™ formula group to the placebo and exercise group were observed. In the study, no adverse events were observed. (Liu SZ, et al. Med Sci Sports Exerc. 2017 May; 49(5) S706. Liu SZ, et al. J Cachexia Sarcopenia Muscle. 2018 Oct.)

SAFETY

All ingredients in AstaMed MYO™ are Generally Recognized As Safe (GRAS) in accordance with the guidelines established by the FDA. In accordance with official FDA safety policies, GRAS status suffices to demonstrate the safety of the ingredients in medical foods, with further assurances of quality and purity via production in a FDA registered facility according to CGMP.

Beyond GRAS status, the safety of the core ingredient, natural astaxanthin as a dietary ingredient, has been demonstrated through additional clinical studies. In a meta-analysis of 41 clinical studies, including a combined total of more than 1,046 subjects who received astaxanthin at the same or greater amounts than that found in AstaMed MYO™, no serious adverse events were reported.

In addition, the safety of tocotrienols as a dietary ingredient has been demonstrated in many clinical studies. In an analysis of 13 clinical studies including more than 488 subjects who received tocotrienol intervention at an amount more than that in AstaMed MYO™, no serious adverse events were reported.

WARNINGS

Allergic Reactions

While the ingredients in AstaMed MYO™ are GRAS, the product may cause an allergic reaction in patients with allergies or sensitivity to any of its ingredients. Patients with known allergies to any of the ingredients should consult their physician before taking AstaMed MYO™.

AstaMed MYO™ contains natural mixed tocopherols derived from fully refined vegetable oils, virgin olive oil, cholesterol from wool grease (lanolin), Elaeis guineensis palm fruit extract, and Haematococcus pluvialis algae extract. Soy derivatives and corn oil and its derivatives can be contained as a part of those ingredients or in the process of manufacturing.

Drug Interactions

There have been no clinical reports on interactions between with any drug products. According to several studies, astaxanthin, the primary ingredient is unlikely to alter the pharmacokinetics of drugs metabolized by CYPs, drug-metabolism relevant enzymes. (Ohno M et al. Food Chem Toxicol. 2011 Jun;49(6):1285-91. and Zheng YF et al. Food Chem Toxicol. 2013 Sep;59:78-85.)

Pregnancy and Breastfeeding

The product is not recommended for women who are or plan to become pregnant. In addition, it is not recommended for women who are breastfeeding. Currently, there is insufficient data to demonstrate the relevant safety during pregnancy and breastfeeding.

Women who are, or plan to become pregnant should consult their physician before taking AstaMed MYO™. The risks and benefits of taking AstaMed MYO™ during pregnancy must be evaluated on an individual basis. Women who are breastfeeding should consult their physician regarding the risks and benefits of taking AstaMed MYO™ while nursing.

STORAGE INSTRUCTIONS

Store at controlled room temperature not to exceed 70°F (21°C) in a cool, dry place and away from light and children. The bottle should be tightly sealed.

Manufactured for:

AstaMed®
1750 112th Avenue N.E. Suite D-155 Bellevue, WA 98004
Tel: 1-425-777-9882
www.astamed.net

AstaMed MYO™ is protected by issued US patent number 6245818 B1 and other pending patents.

AstaMed® reserves all rights. September, 2018.

