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Meschino Health Comprehensive Guide to Accessory Nutrients and Essential Oils

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About the Meschino Health Comprehensive Guide to Accessory Nutrients and Essential Oils

The Meschino Health Comprehensive Guide to Vitamins is one of four eBooks on nutrients written by Dr. James Meschino:

1. Meschino Health Comprehensive Guide to Vitamins
2. Meschino Health Comprehensive Guide to Herbs
3. Meschino Health Comprehensive Guide to Minerals
4. Meschino Health Comprehensive Guide to Accessory Nutrients and Essential Oils

All four books were written to both educate and provide an easy to use quick reference to answer important questions regarding nutrients. Users of the guide can quickly find which health conditions the nutrient can impact, proper dosage, possible effects of a deficiency or the effect any potential toxicity associated with the nutrient. Finally any drug-nutrient Interactions associated with the nutrient.

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Meschino Health is excited to be able to provide tools and resources to help you achieve your healthy living objectives. Sharing the Healthy Living message and helping anyone who is interested in living a healthy happy life is what Meschino Health is all about. Visit www.MeschinoHealth.com to learn the latest a science based research on diet and supplementation that can prevent and treat health conditions often associated with aging. New eBooks and eGuides are added every month and can be downloaded free of charge.

Meschino Health Natural Health Assessment

Welcome to the Nutrition, Lifestyle and Anti-aging Assessment.

The most powerful health assessment on the internet

- Easy to Complete Online Questionnaire
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- The Meschino Health Assessment is a 15 to 20 page comprehensive report complete with diet, lifestyle and supplement considerations that are specific to your profile.

The Meschino Health Assessment is a free service created by Dr. James Meschino. The feedback in your report is based on your answers to the questions in the Health Assessment, and highlights the dietary, lifestyle and supplementation practices that are best suited to your circumstances, according to currently available scientific studies

The Meschino Health Assessment is a Free Service

Why take it?

We all know that we should eat better, exercise more and change some of our less then desirable lifestyle habits. Did you know that 7 out of 10 North Americans are taking some form of nutritional supplements to augment their diet? While that might sound like good news, the downside is that many people are guessing at what supplements to take! So which one should you take? Better yet, what does eating better look like?

You need a plan.

But where would you even begin to find a health assessment that takes into account your personal health status, diet, lifestyle activities and family health history-before recommending a plan of action?

Where? Right here.

Coenzyme Q_{10} (*Ubiquinone*)

General Features

CoQ_{10} is an essential component of the electron transfer system in the mitochondria. More specifically, it functions to shuttle hydrogen electrons from NAD to cytochrome b, facilitating the release of energy required to recouple ADP with inorganic phosphate in the synthesis of ATP. As such, CoQ_{10} is an integral part of the bioenergetic system that enables cells to produce adequate amounts of ATP through aerobic pathways. ATP is the primary fuel required to power the body's metabolic reactions, maintain optimal function of cells and sustain life. A deficit in ATP synthesis can compromise any number of energy-dependent cellular functions and hasten the onset of dysfunction and if severe enough, cell death.

Although the body can synthesize CoQ_{10}, deficiency states of CoQ_{10} tend to exist and are associated with various health conditions. Moreover, supplementation studies with CoQ_{10} have been shown to effectively treat and sometimes reverse a number of these conditions.

There is evidence that a decline in CoQ_{10} synthesis occurs with aging, predisposing individuals to a number of CoQ_{10} deficiency-related disorders and diseases.

Professor F.L. Crane and his colleagues at the University of Wisconsin first discovered CoQ_{10} in 1957. Since then, Dr, Karl Folkers at the University of Texas (Austin) is most responsible for the ongoing research on CoQ_{10}.[1-4]

Coenzyme Q_{10} is also a fat soluble antioxidant, which has been shown to reduce oxidation of LDL-cholesterol and the mitochondrial DNA.[5,6] CoQ_{10} supplementation has been shown to modulate immune system function, enhancing levels of immunoglobulin G (IgG), in the serum of patients provided with 60 mg CoQ_{10} per day.[7]

The average person may consume about 5 mg per day of CoQ_{10} from foods, with the main sources being meat, fish, soybeans and some vegetable oils. Clinical Coenzyme Q_{10} studies have involved daily supplemental intake levels ranging from 60 mg to 300 mg per day; far greater than food alone can provide.[8]

Supplementation Studies and Clinical Applications

1. Cardiovascular Disease

Biopsy results from heart tissue in patients with various cardiovascular diseases (especially congestive heart failure) show a deficiency in CoQ_{10} in 50 to 75 percent of cases. Low blood levels of CoQ_{10} are also a consistent finding in the majority of these patients.[9-12]

Supplementation studies with patients suffering from various cardiomyopathies (i.e. ischemic cardiomyopathy, dilated cardiomyopathy, heart valve disorders) and congestive heart failure have demonstrated significant improvement in heart function (according to the New York Heart Association functional scale) in a high percentage of cases.

Many patients in these studies have been able to reduce the number of cardiac drugs required (1-3 medications reduced in 43 percent of CoQ_{10} supplemented patients in one study of 424 patients, over an eight year period).

Heart function parameters monitored have included left ventricular wall thickness, mitral valve inflow slope, and fractional shortening.[13,14,15]

Congestive Heart Failure - Several controlled studies using Coenzyme Q_{10} supplementation in patients with congestive heart failure have demonstrated significant improvement in cardiac ejection fraction, reduced shortness of breath, and increased muscle strength. Other studies have demonstrated increased stroke volume and cardiac index, improved survival and improved quality of life, in general. Of great significance is the fact that when patients discontinue CoQ_{10} supplementation, cardiac function deteriorates. Thus, CoQ_{10} needs to be a lifelong intervention in these cases.[16,17,18]

Angina - A small study has shown that CoQ_{10} supplementation can reduce angina episodes and nitroglycerine use and improve treadmill exercise tolerance. Larger trials are required to substantiate this data.[19]
Hypertension - Several studies have provided evidence that CoQ_{10} supplementation can lower systolic and diastolic blood pressure (i.e. systolic 164-146, diastolic 98-86) in hypertensive patients. Improved blood cholesterol levels also occurred in one study, with a rise in HDL and a reduction in total cholesterol from 229.9 mg/dl to 213.3 mg/dl.[18-22]

2. Periodontal Disease

Several intervention trials involving patients with periodontal disease have revealed that CoQ_{10} supplementation can be useful in reversing the condition to various degrees.[23,24]

3. Aerobic Exercise Performance

A study of 25 cross-country skiers has provided preliminary evidence that CoQ_{10} supplementation may improve exercise performance in endurance athletes.[25]

Sedentary individuals have also demonstrated improvement with work capacity, oxygen consumption, fat burning and oxygen transport after beginning an exercise program. The group supplemented with CoQ_{10} demonstrated greater improvement in these aerobic parameters compared to the placebo group, in a 4-8 week trial period.[26]

Dosage Ranges

1. Cardiovascular Conditions: typical dosage is 50-60 mg, three times per day. Large doses (up to 300 mg) may be needed in severe heart disease. Some studies use a dosage of 2 mg CoQ_{10} for each kilogram of body weight.
2. Periodontal Disease: 50 mg per day has been used in clinical trials
3. Exercise Performance Studies: 60 mg per day[27]

Toxicity and Contraindications

Coenzyme Q_{10} is well tolerated, and no serious adverse effects have been reported with long-term use.[27]

Drug-Nutrient Interactions

1. Warfarin

CoQ_{10} supplementation has been shown to antagonize the anti-coagulant effects of warfarin, requiring dose adjustment.

2. Beta-Blockers and HMG

CoA Reductase (statin) drugs for cholesterol lowering are known to inhibit the endogenous synthesis of CoQ_{10}. CoQ_{10} supplementation can compensate for this inhibition effect and is indicated as a concurrent therapy when these drugs are in use (100 mg of CoQ_{10} per day is recommended in these cases).

3. Psychotropic Drugs

Coenzyme Q_{10} supplementation has been shown to reduce the cardiac side effects of phenothiazines and tricyclic antidepressant drugs.

4. Chemotherapy

Q_{10} supplementation can mitigate the cardiac side effects and cardiotoxicity of the chemotherapy drug known as adriamycin (100 mg per day of CoQ_{10} supplementation). Even children with lymphoblastic leukemia or non-Hodgkin lymphoma realized this benefit compared with the placebo group.[28-34]

5. Anticoagulants

As noted above, there are reported cases of CoQ_{10} countering the action of warfarin. Thus, the physician prescribing warfarin may need to adjust the warfarin dose if CoQ_{10} is to be used and therefore must be consulted.[34,35]

The following drugs may reduce the body's levels of CoQ_{10}:

1. Orlistat: reduces CoQ_{10} absorption.[36]
2. Beta blockers: decreases CoQ_{10} synthesis.[37]
3. Biguanides: decreases CoQ_{10} synthesis.[38]
4. Clondine: decreases CoQ_{10} synthesis.[39]
5. Gemfibrozil: (cholesterol-lowering drug).[40]
6. Haloperidol: decreases CoQ_{10} synthesis.[41]
7. HMG-CoA Reductase inhibitors: decreases CoQ_{10} synthesis.[42]
8. Hydralazine: decreases CoQ_{10} synthesis.[37]
9. Methydopa: decreases CoQ_{10} synthesis.[39]
10. Phenothiazines: decreases CoQ_{10} synthesis.[41]
11. Sulfonylureas: some of these drugs decrease CoQ_{10} synthesis (acetohexamide, glyburide, tolazamide).[38]
12. Thiazide Diuretics: decrease CoQ_{10} synthesis.[39]
13. Tricyclic Antidepressants: decrease CoQ_{10} synthesis.[41]

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Creatine

General Features

It is now widely accepted that Creatine supplementation can increase muscle strength and mass.[1,2,3,4] Creatine is an amino acid that is stored in muscle in the form of Creatine phosphate. During explosive or intensive exercise, Creatine phosphate is broken down by a specific enzyme to yield Creatine, plus phosphate, plus free energy. The free energy released from the breakdown of Creatine phosphate is used to regenerate ATP, which is the fuel that powers muscle contraction.[2]

The normal daily requirement for Creatine is about 2 grams for a person weighing 70 kg. Animal protein (especially meats) normally provides at least half that amount, with approximately one gram per day synthesized by the liver. A half-pound of raw meat contains about 1 gram of Creatine, but fish is also a good source.

A number of recent studies have demonstrated that short-term Creatine supplementation increases Creatine phosphate stores in skeletal muscle by 10% to 40%.[3] This in turn leads to an increase in muscle mass, which is thought to occur from increased protein synthesis, as the muscle lays down an increased number of contractile myofilaments (protein bands that contract and generate force). Increased muscular fluid retention may also participate in muscle volume gains with Creatine use.[5,6,7] Creatine has also been shown to provide antioxidant properties. This may be of some significance as free radicals generated from exercise can affect muscle fatigue and protein turnover.[24]

It also appears that Creatine supplementation may allow athletes to train harder (due to increased available energy for muscle concentration), which promotes strength gains, and increases muscle size due to hypertrophy (larger muscle fiber size).[2,3]

The established protocol for Creatine supplementation used by athletes involves a loading dosage of 20 to 25 grams per day for the first 5 to 7 days. Typically an athlete will mix a heaping teaspoon of Creatine monohydrate crystals into a glass of juice to obtain about 5 grams of Creatine. During the loading phase the athlete does this on 4 or 5 occasions throughout the day to attain an intake of 20-25 grams. After the loading phase is completed, the maintenance daily dosage is usually 5 to 10 grams per day. Recent reports suggest that taking Creatine with glucose (a simple carbohydrate) may increase the amount of Creatine absorbed by the muscles. As such, some manufacturers combine Creatine with carbohydrates in a premix product to help improve Creatine delivery to muscles.[25]

Clinical Application and Mechanism of Action

1. Increased Strength and Performance In Athletes

Several studies have shown that Creatine supplementation improves performance in repeated bouts of high intensity strength work and repeated sprints, which are requirements for many sports.[8,9,10,11,12,13,14,16,17,18] In short, substantial evidence suggests that Creatine supplementation increases lean body mass, muscular strength, and sprint power.[24]

Significant gains in strength and lean mass often occur in the first 6 weeks of Creatine supplementation, when combined with proper training and diet. In one study, college football players who took Creatine supplements for 28 days during resistance and agility training had significant gains in lean mass when compared to players who took the placebo.[15]

Individuals may vary in their response to Creatine supplementation, but it is not uncommon to see a 5 to 10 lb. increase in weight within the first six weeks.

Approximately 80% of Creatine studies have reported a performance-enhancing effect. This is quite impressive when you consider the fact that Creatine is not structurally or functionally related to anabolic steroids, and that Creatine supplements are not banned by the International Olympic Committee or the National Collegiate Athletic Association. Creatine use is based on the same principle as carbohydrate loading in that an athlete is manipulating their dietary intake to optimize muscle Creatine phosphate stores for more explosive power and enhanced performance.

Athletes requiring repeated bouts of explosive power may also benefit from Creatine supplementation as demonstrated by M. Izquierdo et al. Among other positive benefits revealed in their study of nineteen trained athletes, they showed that short-term Creatine supplementation (20 gms per day for 5 days) enhanced repeated sprint performance and attenuated decline in jumping ability after repetitive high-power-output exercise bouts (MRPB).[22] Similar results have been documented by G. Cottrell et al, in subjects performing repeated sprint cycling.[23] These studies have important implications for many sports such as hockey, basketball, soccer, volleyball, lacrosse, football, tennis and any sport requiring repeated bouts of all-out lower extremity explosive power and/or jumps.

2. **Neuromuscular Diseases**

   Creatine supplementation in humans has been reported to enhance power and strength both in normal subjects and in patients with various neuromuscular diseases.[14] Clinical studies in patients with ALS (amyotrophic lateral sclerosis).[14] Huntington's disease, Parkinson's disease, Duchenne muscular dystrophy, McArdles disease [15] and Myasthenia Gravis [16] have shown that Creatine supplementation can produce an increase in strength and thus, provide symptomatic treatment and improved quality of life for many of these patients.[14,15,16]

3. **Heart Failure**

   Creatine supplementation has been shown to improve exercise capacity in patients with heart failure in some studies. Along with Coenzyme Q10, hawthorn extract and L-carnitine, Creatine is one of few natural health products that is shown to reverse certain parameters of heart failure. As reported by K. Witte et al, there is evidence for a possible role for micronutrient deficiency in heart failure, of which Creatine may be one of the principle factors.[10,11,17]

4. **Musculoskeletal Rehabilitation**

   Creatine was shown to speed recovery of muscular power in a double blind, placebo-controlled study involving 20 male and female students whose right legs were immobilized in casts for a period of two weeks. Those given Creatine supplementation during and after leg immobilization displayed more muscular power and greater muscle size after three to ten weeks of physical rehabilitation than did subjects who took the placebo.[18]

5. **Anti-Aging in Older Subjects**

   Creatine supplementation provided to active subjects over 70 years of age, and subjects 59-72 years of age, have resulted in significant gains in several indices of muscle performance including increased maximal dynamic and isometric strength, lower body mean power, lower extremity functional capacity, increased fat-free mass, increased lean mass and endurance power. These studies suggest that Creatine supplementation may help to forestall or reverse muscular atrophy and progressive weakness that occurs during aging, and that Creatine may be useful as an intervention to improve the ability of certain elderly individuals to perform functional living tasks, decreasing dependency and, enhancing their quality of life.[19,20]

   Other studies have noted that younger individuals respond to Creatine supplementation more efficiently than do older subjects in that muscular phosphocreatine stores were shown to increase on average by 35% in young subjects (~24 years of age) and 7% in older subjects (~70 years of age) after five days of Creatine supplementation

(20 gms per day). As such, it may take a longer period to maximize Creatine stores in older subjects with Creatine supplentation.[21]

Absorption and Utilization

Creatine absorption from the intestinal tract is very efficient. Studies show that a 6-8 gm oral load of Creatine results in approximately 50% of the ingested Creatine being excreted in the urine. Thus, researchers are still working to identify the ideal single, daily and cumulative doses of Creatine for various applications.[26] Other studies demonstrate that a 5 gm oral load of Creatine, followed by 93 gm oral load of simple carbohydrate in solution (water) at 30 minutes post-Creatine intake (4-times per day), resulted in a 60% increase in total muscle Creatine compared to subjects ingesting the same amount of Creatine in the absence of a simple carbohydrate drink. Subjects ingesting Creatine and the simple carbohydrate drink had higher insulin levels and significantly less Creatine lost in their urine, indicating that higher insulin levels are likely a key to greater muscle uptake and utilization of Creatine, and a reduction in urinary loss. Thus, it is accepted that Creatine utilization is enhanced by concurrent ingestion of a simple carbohydrate drink (e.g. fruit juice).[25]

Additionally, concurrent administration of Creatine and glycogen reveal that Creatine supplementation enhances muscle levels of glycogen (glycogen supercompensation) beyond that attainable from glycogen loading alone. As supercompensation of muscle glycogen is also an ergogenic factor in exercise performance, the combination of Creatine and carbohydrate loading appear to improve performance by increasing muscle Creatine and muscle glycogen.[27]

Dosage and Standardized Grade (2:1 powdered extract)

1. Athletic Performance (strength, sprint and repeated sprint power, lean mass etc.) - The usual protocol is 5 gm, 4-5-times per day for five consecutive days during the loading phase, followed by 5 gm, twice daily as the maintenance dose. Many athletes cycle one month on, one month off to prevent any possibility of toxicity and to prevent the body from compensating by reducing its own endogenous synthesis of Creatine in the liver.[28,22,23,26,27]
2. Neuromuscular Diseases / Amyotrophic Lateral sclerosis - One study used 20 gm per day in 5 gm divided doses for 7 days, followed by 3 gm per day for 3-6 months.[14] This dose may be appropriate for all neuromuscular diseases mentioned above in regards to adult supplementation, [34] although one patient with myasthenia gravis demonstrated significant improvement with 5 gm of Creatine per day combined with resistance training, 3 times per week.[16] In McArdles disease, a daily dose of Creatine of approximately 10 gm per day, followed by a maintenance dose of approximately 4 gm per day has been used successfully to increase muscular strength. [35]
   Other researchers have shown that a daily adult dose of 10 gm of Creatine per day, and a daily dose of 5 gm of Creatine for children, have been beneficial for individuals with various muscular dystrophies.[39,40]
3. Heart Failure - A daily dose of 20 gm of Creatine per day, in 5 gm divided doses, has shown good results over the 5-10 day test period. Participants showed improvement in strength, endurance and improved skeletal function upon exertion.[17,36,37]
4. Musculoskeletal Rehabilitation During and After Immobilization - Same dose as for athletic performance.[18]
5. Anti-aging in Older Patients - Same dose as for athletic performance.[19,20]

Adverse Side Effects, Toxicity and Contraindications

As for the safety of Creatine supplementation, a 1997 study showed that short-term Creatine use (20 grams per day for 5 days) did not increase markers of kidney stress in five healthy men.[13] A study comparing Creatine users, for up to five years duration, to control subjects has shown that Creatine users have no remarkable differences in their Creatine,

urea, and plasma albumin clearances compared to controls. The researchers conclude that neither short-term, medium-term, nor long-term oral Creatine supplements induce detrimental effects in the kidney of healthy individuals.[29,30,31] To date no liver abnormalities have been evident in short-term Creatine challenge studies.[30] However, individuals with pre-existing kidney disease should be cautious as evidenced by the development of kidney dysfunction in a 25 year old soccer player taking Creatine who previously had been treated for focal segmental glomerulosclerosis of the kidney. His kidney function returned to normal after discontinuing Creatine supplementation.[28]

Some experts suggest that compulsory regular kidney and liver monitoring should accompany the use of Creatine due to the increased burden placed upon the liver and kidneys.[30] As pointed out by other experts, Creatine is normally found in cardiac muscle, brain, and testes, as well as skeletal muscle, and these former tissues have been largely unstudied with respect to the effects of Creatine supplementation.[32] The Food and Drug Administration (FDA) has advised athletes to consult a physician or a health care professional before embarking on any scheme of Creatine loading or supplementaion.[28] Nevertheless, few reported adverse side effects from Creatine use have been reported despite its widespread use among young athletes, with Creatine sales reaching $200 million in the U.S. in 1998.[1]

Other infrequently reported side effects include gastrointestinal disturbances and muscle cramps.[30]

In regards to children and younger athletes, the safety of Creatine supplementation has not yet been investigated in these individuals. Until all safety issues have been evaluated, experts strongly recommend against use of Creatine among children and adolescent athletes.[33]

Overall, Creatine supplementation appears to be safe for healthy adults. It's a low molecular weight compound that is excreted in the kidneys by simple diffusion. In the maintenance phase, athletes consume only slightly more Creatine (3-5 gm per day) than is generally found in the diet, which is usually about 2 gm per day.[10,11]

Drug-Nutrient Interactions

There are no well-known drug-nutrient interactions for Creatine at this time.[38]

Pregnancy and Lactation

During pregnancy and lactation, the only supplements that are considered safe include standard prenatal vitamin and mineral supplements. All other supplements or dose alterations may pose a threat to the developing fetus and there is generally insufficient evidence at this time to determine an absolute level of safety for most dietary supplements other than a prenatal supplement. Any supplementation practices beyond a prenatal supplement should involve the cooperation of the attending physician (e.g., magnesium and the treatment of preeclampsia.)

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Dehydroepiandrosterone (DHEA)

General Features

DHEA is an intermediate steroid hormone produced mostly by the adrenal glands. All steroid hormones are derived from cholesterol. In the synthesis of adrenal androgen hormones cholesterol is converted to pregnenolone and then to DHEA. From DHEA the adrenal glands can synthesize androstenedione, which is further converted to testosterone. In fat tissue androstenedione can be converted to estrone hormone by the aromatase enzyme, which is also known as estrogen synthase enzyme. Thus, DHEA supplementation can affect the increased production of androstenedione as well as testosterone and estrogen.

DHEA is the most abundant hormone made by the adrenal glands. Some DHEA is secreted by the adrenal glands and circulates in the bloodstream, where it is picked up by other tissues (i.e. adipose, testis, ovaries) and further converted into other androgens or estrogens.

The serum concentration of DHEA (really DHEA - sulfate), is used as a measure of adrenal androgen production, when monitoring various conditions.[1]

DHEA supplements can be made in the laboratory from diosgenin a steroid compound found in wild yams. However, the body is unable to convert diosgenin into DHEA or any other hormone. Thus, supplementing with wild yam as a means to affect hormone levels is unsubstantiated.[2]

In humans, DHEA blood levels peak in early adulthood and then starts a lifelong descent. By the age of 70 DHEA levels have declined by up to 75 percent compared with young adult levels. By age 90, we make 90 percent less DHEA than a young adult.[3,4]

These findings have led some researchers to investigate whether returning DHEA levels to those of a young adult (through supplementation) can serve as an anti-aging, and degenerative disease prevention strategy. Preliminary reports in this regard are conflicting. Some evidence suggests that DHEA supplementation (25-200 mg per day) can reverse some parameters of aging and improve wellbeing. Other reports correlate higher blood DHEA levels (and supplementation in some cases) with increased risk of prostate cancer, postmenopausal breast cancer, and ovarian cancer.[5-13]

As a result many health authorities are cautious about recommending DHEA supplementation as an anti-aging intervention. Individuals with a history or family history of breast, ovarian or prostate cancer should not supplement with DHEA indiscriminately until further studies are completed.[14]

The average male produces 31 mg of DHEA per day, while women make about 19 mg.[15]

Supplementation Studies and Clinical Applications

1. **Systemic Lupus Erythematesus (SLE)**

   In a Stanford Medical Center study, DHEA supplementation (200 mg per day) decreased the SLE Disease Activity Index by nearly two points, while the placebo group increased by almost a full point. DHEA patients had significantly fewer flare ups and their required dosage of corticosteroid drug used to control symptoms decreased by 35 percent, whereas the placebo group increased their dose of corticosteroids by forty percent. This was a three-month study only. Long-term benefits are yet unknown and the major side effects in this study was mild to severe acne in women in the DHEA group.[16,17]