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Corporate Philosophy

Our Mission

Integrate our passion for racing, knowledge of sports nutrition, integrity, and values to provide endurance athletes with the ultimate, scientifically validated, high-performance racing formulations.

Research Philosophy

Research is the most important value at First Endurance. We are driven by a desire to ensure our products are proven to enhance endurance performance and have scientific validation. At First Endurance, we refuse to reduce costs by using "pixie dust" amounts of ingredients just to dress up the label. Our formulations utilize the same levels (sometimes more) of the active ingredients that were used in the actual human scientific research. We assure effective products by using the same ingredients used in the human clinical studies. We are meticulous about research and go out of our way to make sure we have addressed each of our stringent requirements. All products that First Endurance develops are based on human scientific research.

Commitment to Quality

First Endurance uses only the finest ingredients and follows stringent quality control. Supplements can be easily ruined. Even if you buy the right ingredients, they can degrade quickly and lose their efficacy if they aren't handled under the most stringent controls. We are determined to ensure nothing goes wrong with any step of the way. All First Endurance products are manufactured under the highest manufacturing guidelines assuring potency and strict quality control. Not only do our manufacturing facilities not allow banned substances, we take additional steps to assure complete cleanliness.

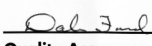
Certificate of Analysis

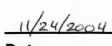
A Certificate of Analysis (C of A) is a document which states every active and inactive substance used to manufacture a product. A C of A also shows that there are no additional ingredients added to any of the first Endurance formulations.

| CERTIFICATE OF ANALYSIS | | |
|-------------------------|---------------------------|--------------------|
| Product : E3 Lemon-Lime | Lot: 4274AA | |
| Formula Ingredients | Specification | Formulation Amount |
| Ascorbic Acid | Assay NLT 99% (dry basis) | Conforms |
| Calcium Carbonate | Assay NLT 99% (dry basis) | Conforms |
| Magnesium Oxide | Assay NLT 99% (dry basis) | Conforms |
| Sodium Chloride | 39% Na+ 61% Cl- | Conforms |
| Di-Potassium Phosphate | Assay NLT 99% (dry basis) | Conforms |
| L-Glutamine | Assay NLT 99% (dry basis) | Conforms |
| Leucine | Assay NLT 99% (dry basis) | Conforms |
| Iso-Leucine | Assay NLT 99% (dry basis) | Conforms |
| Valine | Assay NLT 99% (dry basis) | Conforms |
| Net Formula Weight | 29g | |
| Standard Plate Count | <1000cfu/g | Conforms |
| Coliform | <100cfu/g | Conforms |
| E. Coli | <10cfu/g | Conforms |
| Staph Aureus | <10cfu/g | Conforms |
| Salmonella | negative | Negative |

This product lot number is certified as described above to be manufactured in accordance with the official formulation specification and based on input. Said specifications include the requirement that no additional ingredients can be added beyond those described above.

Certified by:
The raw material specifications for each ingredient are based on the certification of each supplier. Each supplier has been carefully selected and approved for the production of this product to ensure confidence with the Official Formulation and Production Specifications.


Quality Assurance


Date

Safe and Legal

First Endurance is committed to developing the most advanced endurance supplements on the market. First Endurance has taken additional measures to assure that our products are safe legal and stimulant free. First Endurance supplements are legal to use in any sporting event governed by the World Anti-Doping Association (WADA), the US Anti-Doping Association (USADA) and by the UCI (Union Cycliste International). One or more of the aforementioned governing bodies govern all US Cycling, International Cycling, US Triathlon and International Triathlon and USTF.

Some commonalities among these governing bodies include banned substances which fall into one or more of the following categories as listed in Section I A-E of the UCI Prohibited Classes of substance and Prohibited Methods document. A) Stimulants B) Narcotics C) Anabolic agents D) Diuretics and E) Peptide hormones, mimetics and analogues. This document goes on to list banned substances within each of these classes. Regulations also ban 'Compounds chemically or pharmacologically related to the products mentioned'.

First Endurance products contain NO ingredients which are explicitly listed under the banned substance list, and none of the ingredients are related chemically or pharmacologically. First Endurance has also contacted the USADA and received verbal confirmation that our ingredients are not banned based on their regulations. Note: USADA, WADA and UCI do not offer any certification or written confirmation.

First Endurance manufactures its formulations to the highest GMP (Good Manufacturing Practice) standards available. In addition, a proprietary manufacturing method is used for added safety and assurance.

All ingredients used in First Endurance formulations come from audited suppliers who do not carry, broker or supply any banned substances. In addition our manufacturing facility does not allow banned substances in any products manufactured.

Part XIV Article 7 of the Anti-doping Examination Regulations contains the following warning:
riders must refrain from using any substance, foodstuff or drink of which they do not know the composition. It must be emphasized that the composition indicated on a product is not always complete. The product may contain prohibited substances not listed in the composition.

For a complete list of regulations and banned substances please use one of the following links:

[UCI Banned Substance List](#)

[WADA](#)

[USADA](#)

Multi-V Supplement Facts

Use Directions: Take three (3) tablets with your pre-exercise meal.

| Supplement Facts | | |
|---|-----------------------|------|
| Serving Size: 3 Tablets | | |
| Servings per Container: 30 | | |
| Supplement Facts | Amount Per Serving | %DV* |
| Vitamin A (100% as beta-carotene) | 5,000 IU | 100% |
| Vitamin C (as ascorbic acid and calcium ascorbate) | 400mg | 670% |
| Vitamin E (as natural d-alpha tocopherol & mixed tocotrienols) | 200 IU | 670% |
| Vitamin B1 (as thiamin) | 4 mg | 250% |
| Vitamin B2 (as riboflavin) | 5 mg | 300% |
| Niacin (as niacinimide) | 20 mg | 100% |
| Vitamin B6 (as pyridoxine hydrochloride) | 4 mg | 250% |
| Folate (as folic acid) | 400 mcg | 100% |
| Vitamin B12 (as cyanocobalamin) | 30 mcg | 500% |
| Biotin | 300 mcg | 100% |
| Pantothenic Acid (as d-calcium pantothenate) | 20mg | 200% |
| Iodine (as Potassium Iodide) | 150mcg | 100% |
| Magnesium (as oxide and amino acid chelate) | 250mg | 65% |
| Zinc (as oxide and gluconate) | 30mg | 200% |
| Selenium (as amino acid chelate) | 140mcg | 200% |
| Copper (as gluconate) | 2mg | 100% |
| Manganese (as gluconate) | 2mg | 100% |
| Chromium (as Chelavite® amino acid chelate) | 120mcg | 100% |
| Molybdenum (as citrate) | 75 mcg | 100% |
| Iron (as Ferrochel® amino acid chelate) | 18mg | 100% |
| Carbogen® Enzyme Blend | 160mg | * |
| Omega 3 Fatty Acids | 100mg | * |
| Oractive Fruit Extracts (Elderberry, Red Grape, Cranberry, Billberry)(guaranteed 8,000 ORAC value) | 50mg | * |
| Ginkgo Biloba Extract (min 24% Ginkgoflavone glycosides, 6% terpenoids) | 120mg | * |
| Green Tea Extract (<i>Camillia Sinensis</i> , leaves) | 200mg | * |
| Antioxidant Support Blend [Citrus Bioflavonoid extract 10:1, Turmeric extract (minimum 7% Curcumin), Grape Seed Extract (minimum 95% Proanthocyanadins), Alpha Lipoic Acid] | 500mg | * |
| *Daily Value Not Established | | |
| **Percent Daily Values are based on a 2,000 calorie diet. | | |

About Multi-V – *Multi-Nutrient Endurance Vitamin*

Multi-V™ is the first multi-nutrient vitamin that's clinically proven to enhance endurance. The nutrients in Multi-V have been shown to effectively protect athletes from the stresses of exercise and to improve endurance. Multi-V is the only multivitamin that contains Carbogen®, a patented enzyme blend that has been shown in clinical studies to improve carbohydrate utilization, and significantly increase time to exhaustion.

Multi-V is unlike any other multivitamin available. This unparalleled formulation contains a number of special ingredients (besides vitamins and minerals) that address the unique requirements of endurance athletes. In addition to having the highest-quality, most bio-available vitamins and chelated minerals available, this special endurance formula delivers clinically effective doses of enzymes, iron, green tea, ginkgo biloba and omega-3 fatty acids. Multi-V is formulated with Ferrochel Iron- a highly bioavailable source of iron which is non-toxic and does not affect the absorption of minerals like other iron sources do.

The vitamin and mineral content of Multi-V was designed to offer the nutrients necessary to address the needs of endurance athletes without “dressing up” the label by loading the formula with mega-doses. This formula works as a stand alone multivitamin as well as synergistically with the vitamins and minerals found in other First Endurance products. The researchers at First Endurance paid close attention to the levels of antioxidants, vitamins and minerals to assure athletes using Ultragen, E3, Optygen and Multi-V are receiving the ideal levels of all key nutrients in order to maximize training.

Vitamin and Mineral Functions

Beta-Carotene (Vitamin-A): Vitamin A helps form and maintain healthy teeth, skeletal and soft tissue, mucous membranes, and skin. It is also known as retinol because it generates the pigments in the retina. Beta-carotene, which has antioxidant properties, is a precursor to Vitamin A. Antioxidants destroy free radicals, which are unstable substances that can react with and damage cells, tissues and organs. Free radicals are believed to be associated with many of the degenerative changes seen with aging.

Ascorbic Acid (Vitamin C): Vitamin C is required for the growth and repair of tissues in all parts of your body. It is necessary to form collagen, an important protein used to make skin, scar tissue, tendons, ligaments, and blood vessels. Vitamin C is essential for the healing of wounds, and for the repair and maintenance of cartilage, bones, and teeth. Vitamin C is one of many antioxidants. Antioxidants are nutrients that block some of the damage caused by free radicals, which are by-products that result when our bodies transform food into energy.

Vitamin E (Natural d-alpha tocopherol): Vitamin E is an antioxidant that protects body tissue from damage caused by unstable substances called free radicals. Free radicals can harm cells, tissues, and organs, and they are believed to be one of the causes of the degenerative processes seen in aging. Vitamin E is also important in the formation of red blood cells and it helps the body to use vitamin K.

Thiamine (vitamin B-1) helps the body cells convert carbohydrates into energy. It is also essential for the functioning of the heart, muscles, and nervous system.

Riboflavin (vitamin B-2) works with the other B vitamins. It is important for body growth and red blood cell production and helps in releasing energy from carbohydrates.

Niacin assists in the functioning of the digestive system, skin, and nerves. It is also important for the conversion of food to energy.

Vitamin B-6 plays a role in the synthesis of antibodies by the immune system. Antibodies are needed to fight many diseases. Vitamin B-6 helps maintain normal nerve function and also acts in the formation of

red blood cells. It is also required for the chemical reactions needed to digest proteins. The higher the protein intake, the more the need for vitamin B-6.

Folic acid works along with vitamin B-12 and vitamin C to help the body digest and utilize proteins and to synthesize new proteins when they are needed. It is necessary for the production of red blood cells and for the synthesis of DNA (which controls heredity and is used to guide the cell in its daily activities).

Folic acid also helps with tissue growth and cell function. In addition, it helps to increase appetite when needed and stimulates the formation of digestive acids.

Vitamin B-12, like the other B vitamins, is important for metabolism. It helps in the formation of red blood cells and in the maintenance of the central nervous system.

Biotin is essential for the metabolism of proteins and carbohydrates (like the other B vitamins), and in the synthesis of hormones and cholesterol.

Pantothenic acid is essential for the metabolism of food. It is essential in the synthesis of hormones and cholesterol. Cholesterol is needed by the body for the proper functioning of its cells' membranes, particularly in the brain.

Iodine is essential for the normal metabolism of cells. It is a necessary nutrient for the production of thyroid hormones and normal thyroid function.

Magnesium in the body serves several important metabolic functions. It plays a role in the production and transport of energy. It is also important for the contraction and relaxation of muscles. Magnesium is involved in the synthesis of protein, and it assists in the functioning of certain enzymes in the body.

Zinc plays an important role in the proper functioning of the immune system in the body. It is required for the enzyme activities necessary for cell division, cell growth, and wound healing. It plays a role in the acuity of the senses of smell and taste. Zinc is also involved in the metabolism of carbohydrates.

Selenium has a variety of functions. The main one is its role as an antioxidant in the enzyme selenium-glutathione-peroxidase. This enzyme neutralizes hydrogen peroxide, which is produced by some cell processes and would otherwise damage cell membranes. Selenium also seems to stimulate antibody formation in response to vaccines. It also may provide protection from the toxic effects of heavy metals and other substances. Selenium may assist in the synthesis of protein, in growth and development, and in fertility, especially in men. It has been shown to improve the production of sperm and sperm motility.

Copper, along with iron, helps in the formation of red blood cells. It also helps in keeping the blood vessels, nerves, immune system, and bones healthy.

Chromium is important in the metabolism of fats and carbohydrates. Chromium stimulates fatty acid and cholesterol synthesis, which are important for brain function and other body processes. It is an activator of several enzymes, which are needed to drive numerous chemical reactions necessary to life. Chromium is also important in insulin metabolism.

Iron is part of hemoglobin in red blood cells and myoglobin in muscles. The role of both of these molecules is to carry oxygen. Iron also makes up part of many proteins and enzymes in the body.

Reference: United States National Library of Medicine <http://www.nlm.nih.gov/>

Antioxidant- *Unmatched Protection*

The antioxidant profile in Multi-V is unequalled. Oxygen Radical Absorbance Capacity (ORAC) testing is recognized as the “gold standard” for measuring antioxidant protection against oxidative damage. Multi-V is one of the first products to utilize this important technology to ensure superior antioxidant protection. This new testing method allows nutrients to be qualified in their antioxidant capacity with a number. Multi-V contains some of the highest tested nutrients found, with ORAC values of 8,000 units or more, and guarantees this with thorough analytical tests. In addition, Multi-V contains an antioxidant support blend that includes bioflavonoids, turmeric extract, grape seed extract and alpha lipoic acid. These antioxidants are widely considered to be the best antioxidants available. This is one of the many ways Multi-V helps protect endurance athletes from the stresses and demands of everyday training and racing.

Every athlete probably knows of antioxidants for their health benefits, but can antioxidants make an athlete faster? How do antioxidants fit into an athlete's regimen for performance and recovery? What exactly is an antioxidant? Tending to look first at products for performance and then at recovery systems, athletes often overlook antioxidants. Crucial not only for the health of the cardiovascular system, they can also aid in performance and recovery. For many years scientists as well as consumers have known of the antioxidant powers of vitamins E & C and selenium. Today, this category has expanded to include oligomeric proanthocyanidins (OPCs), alpha lipoic acid, grape skin, grape seed, beta-carotene, lutein, tocopherols, tocotrienols and various other compounds. It can certainly be confusing since so many supplements, both traditional and newly introduced, can be classified as antioxidants.

Effects of Oxidative Stress

Oxidative stress is the sum of all chemical reactions giving rise to free radicals or “reactive oxygen species” (ROS) in the body. Free radicals (or ROS) are molecules containing oxygen that have unpaired electrons in the outer orbital. These unpaired electrons are what make the molecule *reactive* which eventually can lead to cell damage in the body. Many diseases and disorders are the result of damage to cellular components by free radicals. These free radicals can cause damage to cellular proteins, lipids, carbohydrates and DNA. The resulting stress contributes to tissue damage and eventually leads to cell death (referred to as lipid peroxidation). In addition to damage from free radicals, oxygen that simply exists within aerobic systems -- like the human body -- creates toxic metabolites, which in turn cause damage to cells. ROS are generated when the body is exposed to a variety of different conditions and environments (see table 1 for examples). But it's not all bad news. Superoxide dismutase (SOD) and glutathione peroxidase, among others, are naturally occurring antioxidant enzymes which combat the effects of ROS in the body.

| <i>Table 1. Situations and/or Environments that Generate ROS</i> |
|---|
| Pollutants (CO ₂ , NO ₂) |
| UV Light |
| Increased oxygen consumption (high intensity activity) |
| Radiation |
| Inflammation |
| Altitude |
| Drugs |

Antioxidants Are...

Keep in mind that free radicals have one or more unpaired electrons that try to remove an electron from a stable molecule in order to stabilize themselves. Therefore, an antioxidant is a nutrient that offers an electron-rich binding site for these damaging free radicals, giving them a preferential site to bind to and pair up with missing electrons. So even though it seems like simple breathing is not healthy, the oxidation damage caused by the air we take in can be overcome with proper antioxidant protection. As noted above, SOD, an enzyme that occurs naturally in the body, is part of our defense system against free radical damage. There are also antioxidants like vitamin E, C and A, vitamin-like compounds (glutathione, lipoic acid, bilirubin), and phytochemicals (flavonoids, polyphenols) that can play a role in our defense system when consumed in a balanced diet through foods or taken orally as dietary supplements. You probably recognize now that oxidative stress is unavoidable for humans, but of special concern to us as endurance athletes -- cycling on long roads, running trails and swimming in the open water - is the greater oxygen demand, the altitude, the UV rays, inflammation, and pollution, which compound normal cell damage.

Endurance Athletes and Antioxidants

Athletes who train competitively experience more oxidative stress than the average individual. In fact, studies have shown that endurance and strength training athletes produce more free radicals than sedentary individuals. However, it is not clear whether strenuous exercise increases the need for additional antioxidants. This oxidative stress not only causes damage to our cells and DNA, it may also limit our aerobic capacity. On the other hand, there is growing evidence that free radicals serve as signals to stimulate the adaptive processes in muscle cells. Antioxidants from food and supplementation may help maintain the integrity of cell membranes, allowing oxygen to be carried more efficiently and effectively to the working muscles. Damage to membranes may compromise the blood's oxygen carrying capacity, negatively affecting aerobic performance. Antioxidants like vitamin C also have powerful immune enhancing properties, beneficial because intense exercise may cause a suppressed immune system in endurance athletes who are at increased risk for upper respiratory tract infections (URTI), although the data show mixed results. For example, after an intense aerobic bout you may notice phlegm and coughing that lasts a few hours or a few days. Vitamin C may help combat this suppressed immune function allowing an athlete to train at a higher level day in and day out.

Oxygen Radical Absorbance Capacity (ORAC) = Antioxidant Quality

Oxygen Radical Absorbance Capacity (ORAC), an analytical method developed by Dr. Cao and Dr. Ronald Prior in conjunction with the USDA Human Nutrition Research Center on Aging at Tufts University in Boston, MA and Brunswick Laboratories, Inc., Wareham, MA, measures the quality of an antioxidant. The clinical data supporting this methodology, though not yet widely accepted without scrutiny, has become the gold standard for the measurement of an antioxidant's free radical scavenging ability. ORAC is a quantitative measure of an antioxidant's ability to neutralize oxygen free radicals. Foods that score high in ORAC help protect cells and their components from oxidative damage. The higher a food's ORAC score, the better it is at helping our bodies fight against the damages of oxidative stress.

New Research (2004-2005)

The correlation between fruit and vegetable consumption and antioxidant status was proven several years ago. However, it is becoming more apparent in recent years that some athletes are not obtaining adequate amounts of antioxidant compounds in their diet due to a low intake of fruits and vegetables. While there is still debate regarding the efficacy of dietary supplementation with antioxidant compounds, there have been a few recent studies that are of special note.

One study compared the effects of normal antioxidant supplementation with reduced antioxidant supplementation in acute, high intensity exercise of up to 40 minutes. The reduced antioxidant group noticed a three-fold decrease in antioxidant intake and caused the athletes to have a higher rating of perceived exertion and a lower antioxidant capacity and circulating antioxidant concentrations. However, time to fatigue was not significantly different and the authors concluded that supplemental antioxidants

may not be necessary for athletes engaged in less than 40 minutes of high-intensity exercise as long as an antioxidant rich eating plan was followed.

Another study examining the effects of ultra-running (six long duration races in the desert) on antioxidant status found quite the opposite results. Blood draws before the race and 72 hours after the race showed significant decreases in erythrocyte superoxide dismutase activity and in plasma concentrations of retinol, beta-carotene and other carotenoids. This caused an imbalance between oxidant and antioxidant protection in this extreme endurance competition.

Of interesting note on the same topic was a study that evaluated the effects of antioxidant supplementation (vitamins C, E and beta-carotene) on the basal iron status of athletes prior to and following their training and competition season, which lasted for 3 months. Not surprisingly, they found that training decreased antioxidant defenses in the athletes who were not taking antioxidants; however, of particular interest is that they also found decreases in serum iron and iron saturation in these same athletes. This may indicate that antioxidant supplementation may prevent the decrease of iron stores and that a link between iron status and oxidative stress could exist.

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Iron- Ferrochel® - Amino Acid Chelate (AAC)

Protected by US Patent# 5,516,925

Multi-V uses a unique form of iron called Ferrochel®. This iron source is organically bonded to amino acid chelates (AAC), forming a highly stable bio-available bond. Unlike iron as ferrous fumarate, iron AAC does not compete with the absorption of some minerals like calcium. In addition, there are no toxicity issues so it's also very safe.

Iron is a trace mineral required for red blood cell formation. In addition, iron plays a critical role in numerous body functions including enzyme systems, neurotransmission, collagen formation and immune system function. Of particular importance is the role iron plays in the formation of hemoglobin and myoglobin -- the proteins that carry oxygen in the blood and muscle tissue.

Iron balance is determined by losses and dietary intake. The body can lose iron via blood, urine, or sweat. Certain circumstance may make athletes more likely to experience iron loss. It has been shown that a significant percentage of runners experience small amounts of gastrointestinal bleeding after runs longer than 10 km. Another possible source is referred to as "foot-strike hemolysis". In this situation a small number of red blood cells burst in the vessels of the feet, due to the pounding of running on a hard surface. Most of the iron in free hemoglobin can be reclaimed, but some is filtered out into the urine. If the exercise is unusually severe, damaged muscle cells will spill myoglobin into the blood where the kidneys will excrete it in the urine. Other studies have questioned this theory by illustrating the similar haematological levels found in swimmers.

There are a variety of sources for dietary iron and several factors which influence how well dietary iron is absorbed. In general, dietary iron is absorbed poorly. Animal sources of iron are about 10 - 25% absorbed. Plant sources are only 2 - 5 % absorbed. Ascorbic acid (vitamin C) increases iron absorption. Healthy women have a dietary iron requirement of approximately 15 mg/day, and men, 10 mg/day, whereas endurance-trained individuals may have even higher requirements.

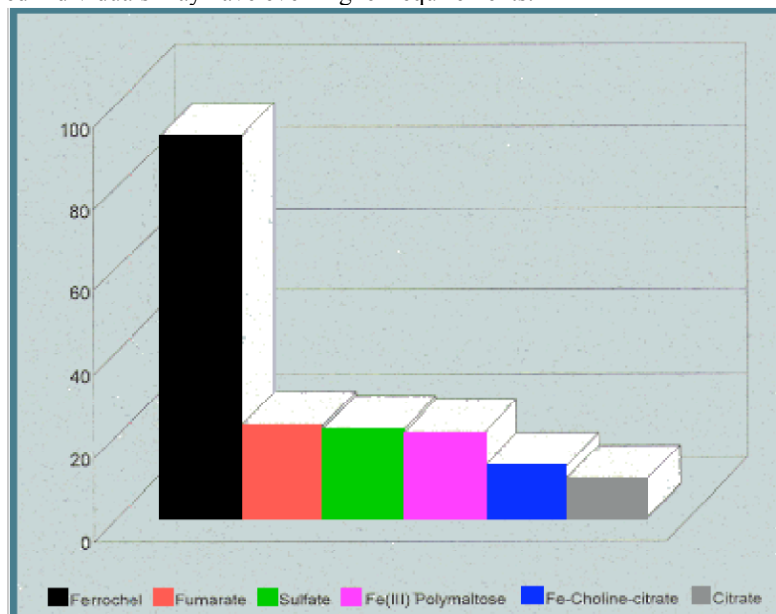
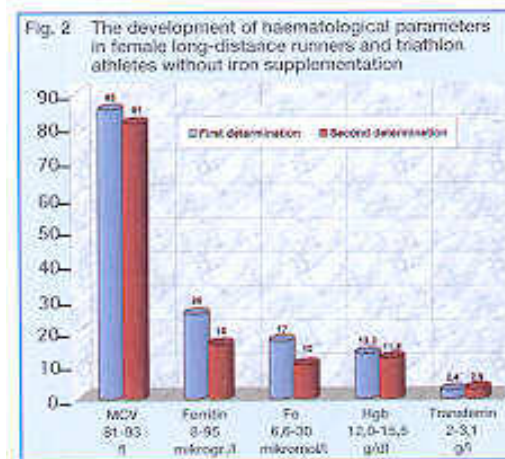
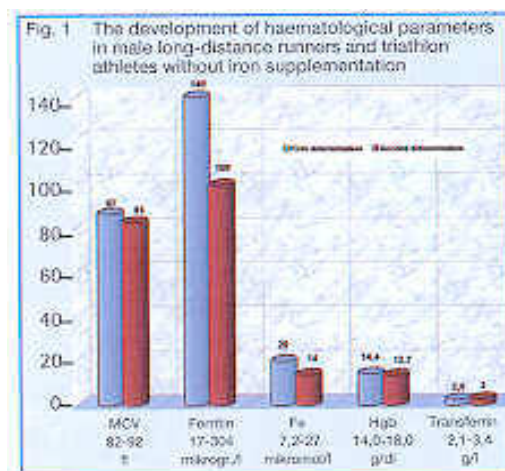


Figure 1. Relative absorption of different iron compounds as compared to iron amino acid chelate (Ferrochel). *Brian & Hallberg, Acta Med Scand, Supp 368, 1960; Pineda & Ashmead, J Appl Nut, 1994.*

Iron deficiency can occur in almost anyone, but the greatest risk occurs in women who are vegetarians. Iron deficiency may begin to affect athletic performance based upon the degree of severity. If it is severe enough to affect the production of hemoglobin (i.e., anemia) then there is no question that performance will suffer. Controversy begins to creep in when one tries to define the earliest onset of iron deficiency. Since ferritin levels are the best measure of total body iron stores, many doctors and coaches will frequently measure this, and the complete blood count, in individuals at risk for iron deficiency. The goal is to try to identify athletes early on before deficiency becomes a problem.

An analysis of the research indicates that all endurance-trained athletes may have a need to supplement with Iron. Endurance athletes who can frequently be mildly iron deficient may be limiting their performance potential. Literature has examined endurance performance of various athletes including runners, triathletes, cyclists and swimmers. The following graphs show the hematological consequence of endurance training on male and female athletes.



It is evident that, in the case of iron-deficiency, the body tries to compensate by increasing the absorption of iron. It is not clear however, whether one can maintain the new equilibrium.

The symptoms of iron-deficiency should be separated from those of anemia because they appear long before anemia is evident and so remain unrecognized. Many times the symptoms are regarded as a result of increased training. In the case of endurance sports, preventive iron supplementation is necessary because our organism cannot cope with the increased loss of iron.

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Carbogen® - Enzyme Blend

Protected by US Patent# 5,817, 350

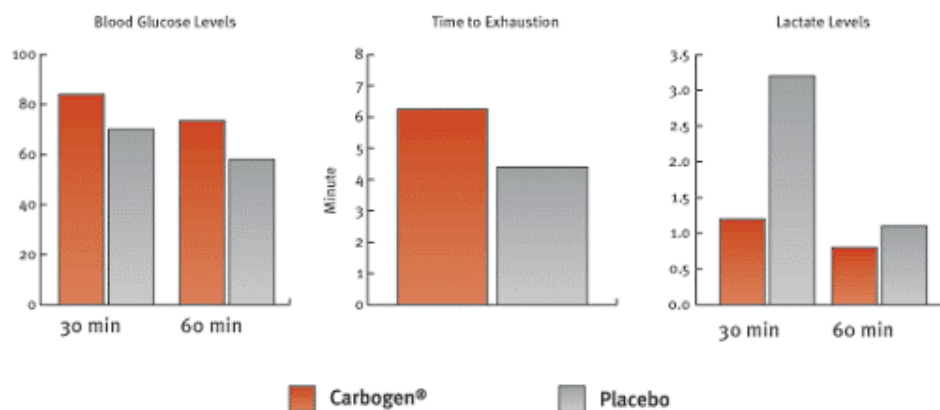
Enzymes are a special type of protein. Enzymes help the body's chemistry work better and more quickly. Each enzyme usually has its own chemical job to do, such as helping to change starch into glucose (sugar).

Carbogen is the patented enzyme blend in Multi-V. Clinical studies on elite cyclists showed Carbogen breaks down multi-chain carbohydrates into simple glucose. This is important for endurance athletes because glucose is readily accessible and useable for working muscles. What's really unique about Carbogen is that even with this fast breakdown of carbohydrates, there is no effect on insulin. This is important because it doesn't create an insulin spike. Blood glucose remains elevated for many hours.

A clinical trial was performed on Carbogen by Triarco Industries, Inc. at the University of Dayton Human Performance Lab, Dayton, OH by Janine T. Baer, Ph.D., RD, Associate Professor of Health and Sport Science. The purpose of the study was to investigate the effect of 160 mg of Carbogen consumed with a meal replacement bar on exercise performance during 60 min of high intensity cycling.

In summary, the clinical study resulted in:

- Significant increase in blood glucose levels during high intensity exercise by 23%
- Sustained increase in blood glucose levels for 5 hours
- Significant decrease in the accumulation of blood lactate by 58% average
- Significant increase in time to exhaustion by 43%
- Decreased rate of perceived exertion (RPE).



After an overnight 12-hr fast 5 trained, male cyclists (mean VO₂ max 70 ml/kg/min) performed two 60-min cycling bouts at 80% VO₂ max followed by a sprint at 100% VO₂ max. Subjects consumed a meal replacement bar plus either 160 mg Carbogen or 160 mg placebo 1 hour prior to each cycling bout. Blood glucose and lactate were determined at: fasting, 1 hr-post feeding, at 30 and 60 minutes of exercise and post-sprint. Glucose levels were consistently higher when Carbogen was used, with the values after 60-min of exercise significantly higher than the placebo (Carbogen 73.8±3.6 mg/dl vs. placebo 58.4± 11.9mg/dl, P<.05) (Graph 1). Lactate values were also consistently lower with the values after 30 min of exercise significantly lower than the placebo (Carbogen 1.2±.05 vs. placebo 3.3±0.23, P<.05) (Graph 2). Subjects were able to maintain a 100% VO₂ max workload significantly longer with Carbogen vs. placebo (6.3±3.4 min vs.4.4± 2.9 min, p<0.001) (Graph 3). Additionally, subjects reported a lower rate of perceived exertion during the exercise trial with Carbogen (mean RPE 12 ± 1.0) vs. placebo (mean RPE 13 ± 1.0).

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Ginkgo Biloba Extract (GBE) – Improved Oxygen Use

The primary active constituents of ginkgo biloba are ginkgo flavone glycosides and terpene lactones, which are standardized in high quality material. The flavone glycosides including quercetin are responsible for the antioxidant properties of ginkgo biloba extract. The terpene lactones, which include ginkgolides A, B and C, as well as bilobalide, possess neuroprotection, improvement of choline (a neurotransmitter) uptake in brain synapses and inhibition of platelet activating factor (which reduces the tendency of the blood to clot). Laboratory and clinical studies have found a great deal of support for the majority of claims made for the therapeutic use of ginkgo biloba extract. Recently ginkgo has been studied for its ability to prevent acute mountain sickness (AMS) through nitric oxide metabolism and peripheral and cerebral blood flow. Ginkgo's ability to improve oxygen use and peripheral circulation is of particular importance to endurance athletes.

Improvement in Oxygen Use

In a 2004 study, ginkgo biloba showed an ability to prevent or lessen symptoms of AMS in humans. The mechanism of this effect is poorly understood. One hypothesis is that ginkgo alters nitric oxide (NO) metabolism, possibly by scavenging NO or altering nitric oxide synthase expression and thereby lessening the vasodilatory effects of NO. The study measured exhaled nasal NO output in humans (n = 9) during normoxia and then during acute normobaric hypoxia (goal oxyhemoglobin saturation 75% to 85%) before and after administration of a standardized extract of ginkgo biloba (120 mg twice daily for 5 days). Oxygen saturation, heart rate, and minute ventilation were similar before and after ginkgo biloba administration. Exhaled nasal NO output was increased during normoxia following ginkgo ($p < 0.02$) and reduced during normobaric hypoxia both before ($p < 0.02$) and following ($p < 0.003$) ginkgo. Exhaled nasal NO output during normobaric hypoxia was lowest following ginkgo ($p < 0.003$). Study representatives concluded that ginkgo biloba increases exhaled nasal NO output during normoxia and enhances reduced exhaled nasal NO output during normobaric hypoxia. Results suggest that ginkgo biloba may act to reduce AMS through an effect on NO metabolism.

Improvement in Blood Flow

Ginkgo biloba extract has also been advocated for the improvement of blood circulation. One study investigated the effect of the ginkgo biloba extract (GBE) on skin blood flow in healthy volunteers and accompanying changes in urinary metabolites. Twenty-seven healthy middle-aged subjects participated in this randomized, double-blind, placebo-controlled, crossover study. Subjects received 240 mg/d GBE or placebo for periods of 3 weeks. Skin blood flow was measured on the forefoot. These measurements were performed on 24-h urine samples collected at the end of the intervention periods. Following GBE treatment, overall mean skin blood flow was significantly reduced as compared with placebo. Remarkably, the change of skin blood flow after GBE intervention was proportionally related to blood flow after placebo treatment: subjects showed either an increased, decreased or unaltered skin blood flow. Analyses showed that urinary metabolic patterns differed depending on the change in baseline blood flow after treatment with (BE). The present findings substantiate that GBE has a multi-directional modulating action on blood flow in healthy subjects and support findings of a vasoregulatory role of this extract.

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Green Tea Extract – Stimulating Fatty Acid Use

Green tea is made up of polyphenols (catechins) and flavonols. The primary catechins found in green tea with the most potent antioxidant activity are; epicatechin (EC), epigallocatechin (EGC), epicatechin gallate (ECG) and epigallocatechin gallate (EGCG). EGCG makes up about 10 - 50% of the total catechin content and appears to be the most powerful of the catechins. Green tea's antioxidant activity is about 25 - 100 times more potent than vitamins C and E. Green tea is generally standardized to total polyphenol content and/or EGCG content. For years this extract has been widely studied for its wealth of health benefits including blood clotting reduction, cholesterol lowering, weight loss and as an anti-carcinogen. Recently green tea has also shown an ability to improve endurance performance.

A study done on mice investigated the effects of green tea extract (GTE), on endurance capacity, energy metabolism, and fat oxidation in mice over a 10-week period. Swimming times to exhaustion for mice fed 0.2-0.5% (wt/wt) GTE were prolonged by 8 - 24%. The effects were dose-dependent and accompanied by lower respiratory quotients and higher rates of fat oxidation as determined by indirect calorimetry. In addition, feeding with GTE increased the level of beta-oxidation activity in skeletal muscle. Plasma lactate concentrations in mice fed GTE were significantly decreased after exercise, concomitant with increases in free fatty acid concentrations in plasma, suggesting an increased lipid use as an energy source in GTE-fed mice. Epigallocatechin gallate (EGCG), a major component of tea catechins, also enhanced endurance capacity, suggesting that the endurance-improving effects of GTE were mediated, at least in part, by EGCG. The beta-oxidation activity and the level of fatty acid translocase/CD36 mRNA in the muscle was higher in GTE-fed mice compared with control mice. These results indicate that GTE is beneficial for improving endurance capacity and support the hypothesis that the stimulation of fatty acid use is a promising strategy for improving endurance capacity.

In the new study, published on-line in the journal *Life Sciences* (doi: 10.1016/j.lfs.2005.11.001), looked at the effect of EGCG on hypoxia-induced apoptosis for human haematoma cells. This study found Epigallocatechin gallate (EGCG), the main extract from green tea, improves oxygen flow to tissues deprived of adequate supply, claims new research from South Korea.

Hypoxia occurs when oxygen supply to tissue or the whole body is restricted. If cells are denied oxygen for too long they die, a process called apoptosis. The most well known form of hypoxia is altitude sickness, which can occur when travellers go above an altitude of 1,829 to 2,438m. Cells were exposed to varying concentrations of the tea extract (12.5, 25, 50, 100 micromoles) and the number of live cells tested. In the control cell culture, 40 per cent of cells died due to lack of oxygen. In the test groups though cell death was decreased for all EGCG concentrations. Exposure to 12.5 micromoles of EGCG reduced cell death by 10 per cent, while all cells were still alive in after exposure to 100 micromoles of EGCG. The mechanism was proposed to be due to Green Tea preventing the expression of a certain enzyme called caspase 3, which plays a important role in programmed cell death.

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Murase T; Haramizu S; Shimotoyodome A; Nagasawa A; Tokimitsu., Green tea extract improves endurance capacity and increases muscle lipid oxidation in mice. Am J Physiol Regul Integr Comp Physiol 2005 Mar; 288(3):R708-5 I Biological Science Laboratories, Kao Corporation, 2606 Akabane, Ichikaimachi, Haga-gun, Tochigi 321-3497, Japan.

Multi-V Q & A

Q: What is Multi-V?

A: Multi-V is a new multi-nutrient formula that provides endurance athletes with endurance specific vitamins, minerals and nutrients needed for endurance exercise training and racing. This formula is unique in that it's the first with ingredients clinically proven to enhance endurance. Multi-V utilizes the latest clinical research on endurance nutrition and input from some of the best endurance athletes in the world.

Q: What are the benefits of using Multi-V daily?

A: The benefits of Multi-V are:

- Improved Performance
- Unmatched Antioxidant Protection
- Assurance that you are not deficient in any critical nutrients
- Full spectrum of Vitamins and Minerals
- Reduction in sickness caused by over-training
- Most bio-available sources of Nutrients

Q: What is Carbogen[®] and how does it work?

A: Carbogen is the patented enzyme blend in Multi-V. Clinical studies on elite cyclists showed Carbogen breaks down multi-chain carbohydrates into simple glucose. This is important for endurance athletes because glucose is readily accessible and useable for working muscles. What's really unique about Carbogen is that even with this fast breakdown of carbohydrates, there is no effect on insulin. This is important because it doesn't create an insulin spike. Blood glucose remains elevated for many hours. In summary, the clinical studies resulted in:

- *Significant increase in blood glucose levels during high intensity exercise by 23%*
- *Sustained increase in blood glucose levels for 5 hours*
- *Significant decrease in the accumulation of blood lactate by 58% average*
- *Significant increase in time to exhaustion by 43%*
- *Decreased rate of perceived exertion (RPE).*

Q: What will ginkgo biloba do for me?

A: The levels of ginkgo biloba in Multi-V have been clinically shown to improve circulation.

Q: What are chelated minerals and are they better?

A: Chelation is a patented process that creates chemical bonds with nutrients like chromium, iron and magnesium. This process makes minerals highly bioavailable. This is important because it ensures the nutrient is bonded with the amino acid chelate and is easily absorbed and digested.

Q: What is iron amino acid chelate and how is that better than other iron sources?

A: Amino acid chelates (AAC) form a highly stable bio-available bond. Unlike iron as Ferrous Fumarate, iron AAC does not compete for the binding sites of some minerals like calcium. In addition, there are no toxicity issues so it's also very safe. This iron used in Multi-V is highly bio-available and will not diminish your calcium or other minerals.

Q: There are also vitamins, minerals and antioxidants in Ultragen and E3. Do I still need Multi-V?

A: Multi-V is designed to work synergistically with the other First Endurance products. The First Endurance research team reviewed every ingredient in the First Endurance product line to ensure you are getting the levels of nutrients you need for endurance training without worrying about the risk of over-dosing with any ingredient. In addition, Multi-V also works great as a stand-alone multivitamin for your everyday needs.

Q: Why isn't there calcium in Multi-V?

A: Our athletes told us that they did not want to consume more than three tablets in their multivitamin. The addition of calcium to this formula would have required a fourth tablet to the daily dose. In addition, one serving of Ultragen contains 500mg calcium and one serving of E3 contains 100mg calcium. On a

typical training day athletes who use E3 and Ultragen will consume between 600mg (60% RDA) and 900mg(90% RDA) of calcium from Ultragen and E3.

Q: Should I use Multi-V in my off training months? Can I use it every day?

A: Yes. Multi-V is designed to be your daily multivitamin and should be used every day all year long.

Q: What types of athletes should be taking Multi-V?

A: Any athlete that does endurance exercise and training will benefit from Multi-V. The nutrients in Multi-V have been shown in clinical studies to effectively protect endurance athletes from the stresses of exercise and to improve endurance performance.

Q: What is ORAC and why is this good for me?

A: ORAC=Oxygen Reactive Absorbance Capacity. ORAC is a quantitative measure of an antioxidant's ability to absorb oxidative damage. ORAC testing is considered the gold standard for measuring antioxidant capacity, and this new FDA-approved method of testing antioxidants will become commonplace in the future. Multi-V is one of the first products to use this testing method, which ensures you have antioxidant protection and quality that is second to none. Antioxidants generally range from 50 to 9,000 in ORAC scoring. Multi-V's ORAC score of 8,000 provides the level of oxidative protection endurance athletes need to protect them from the stresses and demands of everyday training.

Q: Should I take Multi-V on days I'm not training?

A: Yes. Multi-V is designed to be taken every day, just like any other multivitamin.

Q: When should I take Multi-V?

A: In order to maximize carbohydrate utilization, it's best to take Multi-V one to two hours before training or racing with your pre-exercise meal. Multi-V can be taken with breakfast, lunch or dinner, depending on when you're exercising.

Q: Should I split up the 3 tablet dose into 3 separate meals a day, or should I take them all at once?

A: It's important to take all three tablets all at once in order to get the required dosage of Carbogen, the patented enzyme blend in Multi-V that maximizes carbohydrate utilization.

Q: How many servings are in a container of Multi-V?

A: There are 30 servings per container.