ELITE FUEL: efficiency of energy transmission, utilization and muscle recovery, for life and athletic performance you didn't know you had in you!

5-MTHF (as Quaterfolic®)

5-MTHF is the most biologically active form of this water soluble B vitamin folic acid. It is the preferred way to supplement with folate, due to an array of conditions and gene defects that limit conversion or absorption of folate or folic acid. Quatrefolic® is proven through clinical research to have greater stability, solubility, and bioavailability over calcium salt forms of 5-MTHF.

Folic acid is a man-made form of this vitamin. It is found in FORTIFIED grain-based cereals, grains, and breads. It is also found in many cheap B vitamins and multivitamin supplements, as well as energy drinks. Folic acid is not recommended for human consumption.

It is the form into which the body must convert all other forms of folate before it can be used. Along with vitamin B12, 5-MTHF serves as a donor of methyl groups. The body utilizes methyl groups in many nervous system and metabolic processes, including the conversion of homocysteine to methionine, the synthesis of monoamine neurotransmitters (serotonin, dopamine, epinephrine), the production of melatonin, and the synthesis of DNA. Researchers at Oregon State University found that **athletes who lack B-vitamins have reduced high-intensity exercise performance and are less able to repair damaged muscles or build muscle mass than their peers with optimal levels of B-vitamins.** The study results were published in the International Journal of Sport Nutrition and Exercise Metabolism.

CoQ10

This is a proprietary crystal-free CoQ10 which literally offers unparalleled absorption and bioavailability, compared to any CoQ10 on the market.

It plays a central role in cellular energy metabolism that produces adenosine triphosphate (ATP), the energy currency for muscle contraction and other cellular processes. Organs with high energy demands, such as the heart and liver, have the highest concentrations of CoQ10. It is especially needed for the heart, gastric mucosa, and immune system. Cardiac cells require large amounts of uninterrupted energy. They have a greater number of mitochondria and subsequently more CoQ10 than any other type of cell.

It is found in the mitochondria, the energy-producing center or "powerhouse" of our cells. CoQ10 supplementation can help restore the body's reserves that naturally diminish with age and heavy physical activity. CoQ10 supports healthy heart contractility and circulation, healthy blood pressure levels and exercise endurance.

D-Ribose

D-ribose is a simple 5-carbon monosaccharide used by all living cells as an essential compound in cellular energy metabolism. Ribose is needed to synthesize adenine nucleotides, which are the carbohydrate backbone of genetic material - DNA and RNA, certain vitamins, and other important cellular compounds.

Without ribose, tissues could not produce these life-giving compounds. Adenine nucleotides are required by the heart and muscle tissue to make adenosine triphosphate (ATP), the primary source of energy used by all cells to maintain normal health and function. **When the pool of adenine nucleotides is depressed by disease or strenuous exercise or activity, the level of energy available to the cell is compromised.**

A reduction in cellular energy level can lead to diminished function and reduced physiological health. Two of the most important tissues for fitness, heart and skeletal muscles, do not have the metabolic machinery to make ribose quickly enough to meet the excess demands for energy due to disease, exercise or strenuous activity. A reduced capacity for energy maintenance may impact tissue health and optimal function.

Research has shown that ribose promotes cardiovascular health, reduces cardiac stress associated with strenuous activity and helps athletes reach new heights. Ribose helps the heart and skeletal muscles to maximize energy recovery. If Ribose is not available in sufficient quantity, energy synthesis slows.

Numerous medical studies have shown that energy levels in the heart can be dramatically lowered by exercise or decreased blood flow associated with certain cardiac diseases. Depleted cardiac energy pools may be associated with increased cardiac stress, reduced blood flow to the periphery of the body, fatigue and decreased exercise tolerance.

Ribose is the key nutrient for quickly restoring cardiac energy stores. Taking Ribose can shorten the time needed by heart and muscle tissue to replace energy that is lost through vigorous exercise. Keeping energy pools full helps to keep heart and muscles in good physiological condition, increase power and endurance, and reduce fatigue. Recent research has also shown that ribose supplementation during exercise reduces free radical formation and lowers cardiac stress associated with hypoxia (no oxygen).

Magnesium Malate

Magnesium is a trace mineral that is essential for energy metabolism. It is required as a cofactor of enzymes in all three modes of ATP production in the muscle. In immediate, high intensity energy production, magnesium serves as an essential enzyme cofactor in both the conversion of ADP and inorganic phosphate to ATP and for the conversion of ADP and creatine phosphate to ATP and creatine. During glycolysis, magnesium is required for many reactions, including that which allows pyruvate to be transformed into Acetyl Coenzyme A, the step that bridges anaerobic and aerobic energy production.

Malic acid, in the form of malate, is an important component of the Kreb's cycle. Although there are many steps in the Kreb's cycle, studies have shown that of all the Kreb's cycle intermediates, **only malic acid seems prone to depletion upon extreme physical exertion.** Supplemental malic acid has been shown in research studies to increase the amount of malate in mitochondria, and thus increase the energy production capacity of the cell.

Magnesium Malate is a highly absorbable form of magnesium that provides the benefits of this mineral, along with the benefits of malic acid, a nutrient found to contribute to the process of transforming food into ATP, the body's energy source. Malic acid is a metabolite in the Krebs cycle, which is responsible for the biochemical reactions that produce 90 percent of the energy in the cells of the body.

Methylcobalmin and Coenzyme B12

Methylcobalamin is the preferred form of B12 since it is the bioactive form and therefore better utilized. Methylcobalamin has multiple supportive roles in the body, including red blood cell formation, nervous system health, homocysteine and folate metabolism, melatonin synthesis, and more.

Coenzyme B12 or adenosylcobalamin has been added to aid in utilization of BCAAs. This particular form of naturally occurring B12 is the type required for processing branched chain amino acids through the Krebs cycle. The Krebs cycle is the process by which our mitochondria create ATP to fuel muscle tissue.

A common synthetic form of the vitamin B12, cyanocobalamin, does not occur in nature, but is used in many pharmaceuticals and supplements, and as a food additive, because of its lower cost. This form is not recommended for anyone looking to propel their health!

Although the functions of vitamin B12 are numerous, those important to athletes or exercise enthusiasts include carbohydrate metabolism and maintenance of nervous system tissue (the spinal cord and nerves that carry signals from the brain to muscle tissues). This is because stimulation of muscles via nerves is a critical step in the contraction, coordination and growth of muscles. Vitamin B12 lies at the core of our body's ability to make DNA for new cells, form healthy red blood cells, and turn the food we eat into energy to power our metabolism. Vitamin B12 is necessary for carbohydrate, fat and protein metabolism**.**

N- acetyl-cysteine (NAC)

NAC enhances production of the tripeptide glutathione—a key component of both antioxidant and detoxification enzymes. Once NAC promotes production of glutathione, glutathione is incorporated into crucial antioxidant enzymes (e.g., glutathione peroxidase and glutathione reductase) and detoxification enzymes (glutathione S-transferases). Through the activity of these enzymes, glutathione directly supports antioxidant activity, phase II detoxification in the liver, and the normal breakdown of metabolites, toxins, and other compounds in the body. Glutathione also participates in fatty acid synthesis and amino acid transport across the cell membrane.

NAC supplementation directly improves mitochondrial energy production efficiency. Without sufficient glutathione your body will age quickly and muscle recovery will be significantly slowed.

Quercetin

A powerful all-natural antioxidant found in foods such as blueberries, red apples and grapes. It has been shown in multiple clinical trials to provide sustained energy, increased endurance, immune system

support along with many other health benefits. Quercetin Improves mitochondrial function in brain, liver and muscle cells. **The amount contained in 1 serving of Elite Fuel, is equivalent to eating 40 apples.**

Quercetin literally acts in the body as a "super fuel" because it mimics the positive effects of exercise by enhancing the production of the body's mitochondria, the energy-producing units in cells. Traditionally, exercise training has been the only practical way to increase the amount of mitochondria in cells. The more mitochondria, the more energy that each muscle fiber can produce.

BCAA's (branched chain amino acids)

Leucine, isoleucine and **valine** support everything from high intensity endurance training and anabolic muscle building to improved mental function and mood stabilization. Independent studies have demonstrated that Leucine alone will stimulate muscle growth and turn on enzymes that trigger protein synthesis. BCAA's increase resistance to fatigue, with one study showing a 17% increase in resistance with the amount contained in one serving of Elite Fuel®.

With ample BCAA's available, a person can train harder at levels of insane exhaustion because of increased utilization of fatty acids for energy, in place of the depleted glycogen. Recovery from workouts can also be significantly improved, as muscle soreness post workout is discernibly decreased with BCAA supplementation.

Of course, we must not forget that BCAA's support cardiac health through the creation of new mitochondria, allowing for greater ease of energy production in every metabolically active cell. The scientifically validated 2:1:1 BCAA ratio also promotes healthy insulin levels, delayed mental fatigue, increased lactate threshold, and improved lean mass and strength gains.

Magnesium Creatine chelate

Creatine is an amino acid that is produced in the human liver, kidneys, and pancreas, but is also present in meat and fish. Creatine converts into phosphocreatine, which is stored in muscle fibers and converted into ATP, a vital energy source for cells during high-intensity exercise.

Creatine MagnaPower® also known as magnesium creatine chelate is a fully-reacted magnesium and creatine chelate. Magnesium is needed to drive the conversion of creatine into ATP.

High doses of creatine are not required, since the chelate is not susceptible to acidic cyclization. Gastric disturbances are eliminated since only doses approximately 20% of what would be needed with creatine monohydrate are required. In the stomach, a great deal of creatine can be transformed irreversibly into creatinine, when exposed to the stomach's acidic conditions. Once creatinine is formed, it is no longer of any physiological benefit.

Creatine has been well-researched and numerous scientific studies have documented its benefits to performance and energy metabolism.

Obviously, the magnesium creatine chelate will also serve to provide effective quantities of bio-available magnesium, which along with its many other effects, will work along with creatine to increase the muscle's ability to generate and recycle energy in the form of ATP. Consider that over 60% of all the magnesium in the body is found in the skeleton, and about 27% is found in muscle. Optimal magnesium levels are essential for maximizing performance, recovery and helping the musculoskeletal system hold up under the daily grind.

Beta Alanine

One of the main causes of fatigue during intense exercise is intramuscular acidosis. Carnosine is the major regulator of muscle pH. Beta alanine is the rate limiting factor for carnosine synthesis. Supplementation with beta-alanine has demonstrated an increase in muscle carnosine levels, which leads to an increase in total muscle buffering capacity. This is very important for decreasing the onset of neuromuscular fatigue, improving anaerobic threshold, and time to exhaustion. Beta alanine can benefit both single bouts of exercise lasting more than 60 seconds and multiple bouts of high intensity exercise.

Taurine

Taurine is an amino acid that is crucial for physical and mental stress relief as well as enabling focused energy. High intensity athletic training will lead to depletion of taurine, as it is involved in making fat useable as an energy source. One study demonstrated that increasing taurine levels in rats, increased their fat burning during rest. This would suggest that taurine can play a role in fat loss. Taurine is also very effective as a heart tissue antioxidant, helping to decrease the load on the heart with heavy exercise. Consider that taurine is the most abundant amino acid in heart muscle. If you want to improve your work capacity, your fat utilization as an energy source, and get the most out of your BCAAs, magnesium and beta-alanine, taurine needs to be part of your regimen.

Medium Chain Triglycerides

MCTs can act as an alternative carbon source to glucose for muscle during prolonged exercise. Medium chain triglycerides are broken down by lipase in the stomach and small intestine into medium chain fatty acids (MCFA). The beauty of MCFAs is that they can be metabolized as quickly as glucose. MCFAs can also diffuse into the mitochondria independently of carnitine. Carnitine is already in high demand in working muscle, so any way to get an energy source into the muscle mitochondria without carnitine is a huge plus.

GrapeSeed Extract (GSE)

GSE can improve enzyme activity within the mitochondria of muscle cells related to energy creation. It also reduces intramuscular free radical stress. A study of elite male athletes who supplemented with grape seed extract demonstrated reduced creatine phosphokinase concentrations and increased hemoglobin levels. This would suggest that GSE may enhance physical performance during exercise.

Evaporated Cane Juice

Natural sugar does much more than just make Elite Fuel taste amazing. It increases the insulin response pre-workout to support more efficient uptake of amino acids, nutrients and creatine into muscle tissue. The byproduct of this is favorable muscle energy levels and a decrease in perception of fatigue. The end result is increased opportunity for a "personal best" performance.

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