Your Monthly Update

Dear Colleague

Welcome to the June newsletter from Pure Bio Ltd.

Our topic for this month is athletic performance. More and more broad-spectrum products are currently being launched onto the market, claiming to enhance performance, recovery and overall fitness. But, as with all supplementation, the most efficient, safe and effective way to prescribe is according to the individual's needs. Thorough case-history taking and precise clinical evaluation is the only way to achieve ultimate support for the patient.

Athletic Performance

Ranking	Nutritional Supplements	Botanical Medicine
Primary	Creatine monohydrate (for high-intensity, short duration exercise or sports with alternating low- and high-intensity efforts) Multivitamin-mineral supplements (if deficient) Vitamin C (to reduce pain and speed muscle strength recovery after intense exercise)	
Secondary	Citrate (for high-intensity, short- to intermediate-duration exercise) Creatine (for non-weight bearing endurance exercise) DHEA (for improving strength in older men only) Electrolyte replacement (for ultra-endurance competition only) Glutamine (for reducing risk of post-exercise infection only) HMB (for improving body composition with strength training in untrained people only) Iron (for iron deficiency only) Pyruvate (for exercise performance) Sodium bicarbonate (for performance enhancement in events of specific durations only) Vitamin C (for deficiency only) Vitamin E (for exercise recovery and high-altitude exercise	Panax ginseng (for endurance exercise and muscle strength only) Eleuthero Rhodiola (to improve endurance)

	performance only)	
Other	Arginine/Ornithine (for body composition and strength) Branched-chain amino acids (for high altitude and extreme temperature, for reducing the risk of post-exercise infection, or for preventing decline of mental functioning during exercise) Chromium CLA Coenzyme Q10 Copper L-carnitine Magnesium Medium chain triglycerides Octacosanol Pyruvate (for improving body composition with strength training in untrained people only) Vitamin B-complex Zinc	

Primary – Reliable and relatively consistent scientific data showing a substantial health benefit.

Secondary – Contradictory, insufficient, or preliminary studies suggesting a health benefit or minimal health benefit.

Other – An herb is primarily supported by traditional use, or the herb or supplement has little scientific support and/or minimal health benefit.

Dietary Modification

Calories
Calorie requirements for athletes depend on the intensity of their training and performance. Calorie requirements can be as much as 23 to 39 calories per pound of body weight per day for the training athlete who exercises vigorously for several hours per day. Excessive calorie restriction can result in chronic fatigue, sleep disturbances, reduced performance, impaired ability for intensive training, and increased vulnerability to injury.

Carbohydrates
Carbohydrates are the most efficient fuel for energy production and can also be stored as glycogen in muscle and liver, functioning as a readily available energy source for prolonged, strenuous exercise. For these reasons, carbohydrates may be the most important nutrient for sports performance. Depending on training intensity and duration, athletes require up to 4.5 grams of carbohydrates per day per pound of body weight or 60 to 70% of total dietary calories from carbohydrates, whichever is greater. Emphasizing grains, starchy vegetables, fruits, low-fat dairy products, and carbohydrate-replacement beverages, along with reducing intake of fatty foods, results in a relatively high-carbohydrate diet.

Carbohydrate beverages should be consumed during endurance training or competition (30 to 70 grams of carbohydrate per hour) to help prevent carbohydrate depletion that might otherwise occur near the end of the exercise period. Standard sport drinks containing 6 to 8% carbohydrates can be used during exercise to support

both carbohydrate and fluid needs, but these should not contain large amounts of fructose, which can cause gastrointestinal distress. At the end of endurance exercise, body carbohydrate stores must be replaced to prepare for the next session. This replacement can be achieved most rapidly if 40 to 60 grams of carbohydrate are consumed right after exercise, repeating this intake every hour for at least five hours after the event. High-density carbohydrate beverages containing 20 to 25% carbohydrate are useful for immediate post-exercise repletion.

Adding protein to carbohydrate intake immediately after exercise may be helpful for improving recovery of glycogen (carbohydrate) stores after exercise according to some controlled studies. It appears that adding protein during the post-exercise period is not necessary when carbohydrate intake is high enough (about 0.55 grams per pound of body weight).

Carbohydrate loading, or "super-compensation," is a pre-event strategy that improves performance for some endurance athletes. Carbohydrate-loading can be achieved by consuming a 70% carbohydrate diet (or 4.5 grams per pound of body weight) for three to five days before competition, while gradually reducing training time, and ending with a day of no training while continuing the diet until the event date.

Glycemic index
The glycemic index (GI) is a measure of the ability of a food to raise blood sugar levels after it is eaten. Attention to the GI of carbohydrate sources may be helpful for increasing sports performance. Within one hour before exercise, consuming low GI carbohydrates (such as most fruits, pasta, legumes, or rice) provides carbohydrate without triggering a rapid rise in insulin that could result in hypoglycemia and prevent release of energy sources from fat cells. After exercise, on the other hand, high-GI foods and beverages may be most helpful for quickly restoring depleted glycogen stores.

Protein
Protein requirements are often higher for both strength and endurance athletes than for people who are not exercising vigorously; however, the increased food intake needed to supply necessary calories and carbohydrates also supplies extra protein. As long as the diet contains at least 12 to 15% of calories as protein, or up to 0.75 grams per day per pound of body weight, protein supplements are neither necessary, nor likely to be of benefit. Concerns have been raised that the very high-protein diets sometimes used by body builders could put stress on the kidneys, potentially increasing the risk of kidney disease later in life.

Fat
Some athletes have speculated that consuming a high-fat diet for two or more weeks prior to endurance competition might cause the body to shift its fuel utilization toward more abundant fat stores ("fat adaptation"). However, neither short-term nor long-term use of high-fat diets has been found to improve endurance performance compared with high-carbohydrate diets, and may even be detrimental due to depletion of glycogen stores.

Following a high-fat diet with at least 24 hours of high carbohydrate intake has been suggested as a way to achieve fat adaptation while restoring glycogen levels before endurance competition. While this concept is supported by physiological studies on athletes, no actual performance enhancement was shown when athletes were tested in competitive situations after a five- to six-day high-fat diet followed by 24 hours of high carbohydrate intake.

Water
Water is the most abundant substance in the human body and is essential for normal physiological function. Water loss due to sweating during exercise can result in decreased performance and other problems. Fluids should be consumed prior to, during, and after exercise, especially when extreme conditions of climate, exercise intensity, and exercise duration exist.

Nutritional Supplement Treatment Options

Creatine

Creatine (creatine monohydrate) is used in muscle tissue for the production of phosphocreatine, a factor in the formation of ATP, the source of energy for muscle contraction and many other functions in the body. Creatine supplementation increases phosphocreatine levels in muscle, especially when accompanied by exercise or carbohydrate intake.

Over 40 double-blind or controlled studies have found creatine supplementation (typically 136 mg per pound of body weight per day or 15 to 25 grams per day for five or six days) improves performance of either single or repetitive bouts of short-duration, high-intensity exercise lasting under 30 seconds each, e.g. weightlifting; sprinting by runners, cyclists, or swimmers; and many types of athletic training regimens for speed and power.

Fewer studies have investigated whether creatine supplementation benefits continuous high- intensity exercise lasting 30 seconds or longer. Most studies of endurance performance have found no advantage of creatine supplementation, except perhaps for non-weight bearing exercise such as cycling.

Long-term use of creatine supplementation is typically done using smaller daily amounts (2 to 5 grams per day) after an initial loading period of several days with 20 grams per day.

Multivitamin-mineral supplements

Many athletes do not eat an optimal diet, especially when they are trying to control their weight while training strenuously. These athletes may experience micronutrient deficiencies that, even if marginal, could affect performance or cause health problems.

Antioxidants

Most research has demonstrated that strenuous exercise increases production of free radicals, which can damage muscle tissue and result in inflammation and muscle soreness. Antioxidants, including vitamin C and vitamin E, neutralize free radicals before they can damage the body, so antioxidants may aid in exercise recovery.

Placebo-controlled research, some of it double-blind, has shown that taking 400 to 3,000 mg of vitamin C per day for several days before and after intense exercise may reduce pain and speed up muscle strength recovery. Research has also reported that vitamin E supplementation at a dose of 800 to 1,200 IU per day reduces biochemical measures of free radical activity and muscle damage caused by strenuous exercise. One double-blind trial revealed that a combination of 50 mg per day of zinc and 3 mg per day of copper significantly reduced evidence of post-exercise free radical activity.

Alkalinizing agents

The use of alkalinizing agents, such as sodium bicarbonate, sodium citrate, and phosphate salts (potassium phosphate, sodium acid phosphate, and tribasic sodium phosphate) to enhance athletic performance is designed to neutralize the acids produced during exercise that may interfere with energy production or muscle contraction. The amounts used are 115 to 180 mg of sodium bicarbonate per pound of body weight. These amounts are dissolved in at least two cups of fluid and are taken either as a single ingestion at least one hour before exercise or divided into smaller amounts and taken over several hours before exercise.

Try Basenpulver from Pure Bio as a combination alkaliniser.

Electrolytes

Whilst electrolyte replacement is not as important as water intake, athletes participating in several hours of exercise, especially in hot, humid conditions, should

use sodium-containing fluids to reduce the risk of performance-diminishing and possibly dangerous declines in blood sodium levels.

Glutamine

Intense exercise lowers blood levels of glutamine, which can remain persistently low with overtraining. Glutamine supplementation raises levels of growth hormone at an intake of 2 grams per day – a point of interest because of the role of growth hormone in stimulating muscle growth. Glutamine supplementation is also believed to protect immune function after exercise. A double-blind trial in which athletes were given glutamine (5 grams after intense, prolonged exercise, then again two hours later) reported 81% having no subsequent infection compared with 49% in the placebo group.

HMB

HMB(beta hydroxy-beta-methylbutyrate) is a metabolite (breakdown product) of leucine, one of the essential **branched-chain amino acids (BCAA).** Biochemical and animal research show that HMB has a role in protein synthesis and might, therefore, improve muscle growth and overall body composition when given as a supplement. However, double-blind human research suggests that HMB may only be effective when combined with an exercise program in people who are NOT already elite or professional athletes.

Iron

Iron is important for an athlete because it is a component of haemoglobin, which transports oxygen to muscle cells. Some athletes, especially women, do not get enough iron in their diet. In addition, for reasons that are unclear, endurance athletes, such as marathon runners, frequently have low body-iron levels. However, anaemia in athletes is often not due to iron deficiency and may be a normal adaptation to the stress of exercise. Supplementing iron-deficient athletes with 100 to 200 mg per day of iron increased aerobic exercise performance in some, though not all, double-blind studies.

Amino Acids

Preliminary studies have suggested that supplementing with combinations of amino acids, typically along with carbohydrate, immediately after exercise increases muscle protein synthesis.

Pyruvate

Three controlled studies of untrained individuals using a combination of 6 to 10 grams per day of pyruvate and an exercise program reported greater effects on weight loss and body fat compared with those taking a placebo with the exercise program. However, studies of pyruvate supplementation on exercise performance in trained athletes have also failed to demonstrate any beneficial effect. Seven grams per day did not improve aerobic exercise performance in cyclists.

Zinc

Exercise increases zinc losses from the human body, and severe zinc deficiency can compromise muscle function. One double-blind trial in women found that 135 mg per day of zinc for two weeks improved one measure of muscle strength. A double-blind study of male athletes with low blood levels of zinc found that 20 mg per day of zinc improved the flexibility of the red blood cells during exercise, which could benefit blood flow to the muscles. A safe amount of zinc for long-term use is 20 to 40 mg per day along with 1 to 2 mg of copper. Higher amounts should be taken only under the supervision of a practitioner.

Arginine/Ornithine

At very high intakes (approximately 250 mg/kg body weight), the amino acid **arginine** has increased growth hormone levels, an effect that has interested body builders due to the role of growth hormone in stimulating muscle growth.

Double-blind trials conducted by one group of researchers, combining weight training with either arginine and ornithine (500 mg of each, BID, five times per week) or placebo, found the amino-acid combination produced decreases in body fat, resulted in higher total strength and lean body mass, and reduced evidence of tissue breakdown after only five weeks.

B-complex vitamins

The **B-complex vitamins** are important for athletes, because they are needed to produce energy from carbohydrates. Exercisers have slightly increased requirements for some of the B vitamins, including **vitamin B2**, **vitamin B6**, and **vitamin B5** (pantothenic acid).

Branched-chain amino acids

BCAA supplementation may be useful in special situations, such as preventing muscle loss at high altitudes and prolonging endurance performance, especially in the heat. One controlled study gave triathletes 6 grams per day of BCAA for one month before a competition, then 3 grams per day from the day of competition until a week following. Compared with a placebo, BCAA restored depleted glutamine stores and immune factors that occur in elite athletes, and led to a reported one-third fewer symptoms of infection during the period of supplementation. Studies by one group of researchers suggest that BCAA supplementation may also improve exercise-induced declines in some aspects of mental functioning.

Bromelain

Bromelain is effective for shortening the healing time of such injuries as sprains and strains. Typically, two to four tablets or capsules are taken several times per day.

Caffeine

Controlled research, much of it double-blind, has shown that endurance performance lasting at least 30 minutes does appear to be enhanced by caffeine in many athletes. Effective amounts of caffeine appear to range from 1.4 to 2.7 mg per pound of body weight, taken one hour before exercise. While this amount of caffeine could be obtained in 1 to 3 cups of filtered coffee, most research has used caffeine supplements in capsules, and a recent study found caffeine was not effective when taken as coffee. Caffeine consumption is banned by the International Olympic Committee at levels that produce urinary concentrations of 12 mg per ml or more. These levels would require ingestion of considerably more than 2.5 mg per pound of body weight, or several cups of coffee, over a short period of time.

Calcium

Calcium is important for achieving and maintaining optimum bone density. Some athletes, especially women with low body weight and/or amenorrhea, are at risk for serious bone loss and fractures.

Chromium

Chromium, primarily in a form called chromium picolinate, has been studied for its potential role in altering body composition. Preliminary research in animals and humans suggested that chromium picolinate might increase fat loss and lean muscle tissue gain when used with a weight-training program.

CLA

Conjugated linoleic acid (CLA) is a slightly altered form of the essential fatty acid linoleic acid. Animal research suggests an effect of CLA supplementation on reducing body fat. A double-blind study of a group of trained men and women reported reduced body fat in the upper arm after 12 weeks of supplementation with 1.8 grams per day of CLA.

Coenzyme Q10

Strenuous physical activity lowers blood levels of **coenzyme Q10** (CoQ10). A few studies, using at least four weeks of CoQ10 supplementation at 60 to 100 mg per day,

have reported improvements in measures of work capacity ranging from 3 to 29% in sedentary people and from 4 to 32% in trained athletes.

L-carnitine

L-carnitine, which is normally manufactured by the human body, has been popular as a potential ergogenic aid (i.e., having the ability to increase work capacity), because of its role in the conversion of fat to energy. L-carnitine may be effective in certain intense exercise activities leading to exhaustion, but recent studies have reported that L-carnitine supplementation does not benefit non-exhaustive endurance exercise, anaerobic performance, or lean body mass in weight lifters.

Magnesium

Magnesium deficiency can reduce exercise performance and contribute to muscle cramps. It is likely that magnesium supplementation benefits only those who are deficient or who are not highly trained athletes.

Octacosanol

Wheat germ oil, which contains a waxy substance known as octacosanol, has been investigated as an ergogenic agent. Preliminary studies have suggested that octacosanol improves endurance, reaction time, and other measures of exercise capacity. In another preliminary trial, supplementation with 1 mg per day of octacosanol for eight weeks improved grip strength and visual reaction time, but it had no effect on chest strength, auditory reaction time, or endurance.

Botanical Treatment Options

Ginseng

Extensive but often poorly designed studies have been conducted on the use of Asian ginseng *(Panax ginseng)* to improve athletic performance. While some early controlled studies suggested there might be benefits, several recent double-blind trials have found no significant effects of Asian ginseng on endurance exercise.

Eleuthero

Eleuthero *(Eleutherococcus senticosus)* supplementation may improve athletic performance, according to preliminary Russian research. Eleuthero strengthens the immune system and thus might reduce the risk of post-exercise infection.

Rhodiola

In a double-blind trial, healthy volunteers received 200 mg of an extract of *Rhodiola rosea* (standardized to contain 3% rosavin plus 1% salidroside) or a placebo one hour prior to an endurance-exercise test. Compared with placebo, rhodiola significantly increased endurance, as measured by the time it took to become exhausted. However, after daily use of rhodiola for four weeks, the herb no longer enhanced short-term endurance. Consequently, if rhodiola is being considered as an exercise aid, it should be used only occasionally.

Arnica

Arnica-containing ointments are recommended by many practitioners for the treatment of sprains and strains and other traumatic injuries. Homeopathic arnica tablets are also used by some practitioners for similar conditions.

We always welcome feedback and suggestions.

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