Your Monthly Update

Dear Colleague

Welcome to the December 2013 newsletter from Pure Bio Ltd.

Office Hours over the Christmas Period:

Please note that the office will be open at the following times during the Christmas and New Year period:

Monday 23rd December 2013	normal office hours
Tuesday 24th December 2013	09.00 – 12.00
Wednesday 25th December 2013	**CLOSED**
Thursday 26th December 2013	**CLOSED**
Friday 27th December 2013	normal office hours
Monday 30th December 2013	normal office hours
Tuesday 31st December 2013	09.00 – 12.00
Wednesday 1st January 2014	**CLOSED**

Normal office hours will resume on **Thursday 2nd January 2014.**

Orders will, as usual, be sent out using first class business mail, but please allow ***at least*** 3 extra working days for deliveries to reach their destination during this period.

All of the staff at Pure Bio would like to take this opportunity of thanking you for your much valued custom over this year of ongoing legislative challenges; and to extend to you and your families and staff the very warmest wishes for a happy and peaceful Christmas season.

Don't forget that orders can be placed on our website on www.purebio.co.uk at any time during the Christmas period.

Did you know:

Please note that Thorne have discontinued Iron Picolinate and this product is no longer available from Pure Bio.

However, we are delighted to announce that we will shortly be launching four exciting new products from Pure Encapsulations:

- ***Digestive Enzymes Ultra with Betaine HCl***
- ***Cal/Mag/D liquid***
- ***Joint Support liquid***
- ***SAMe (s-Adenosylmethionine)***

Full details of the products will follow shortly and they will be available to order from the New Year!

We always welcome feedback and suggestions.

The chosen topic for this month is:

Sports Performance

Protocol Summary

Ranking	Nutritional Supplements	Botanical Medicine
Primary	Creatine monohydrate Multivitamin Vitamin C	
Secondary	Casein Protein Alkalinising powder CoenzymeQ10 Electrolytes Glutamine Nitric Oxide Iron Phosphatidyl serine Probiotics Soy Vitamin E	Panax (Asian) ginseng Siberian ginseng Rhodiola rosea
Other	Arginine BCAA Chromium CLA Copper Zinc Carnitine Magnesium Ribose B-complex	Panax ginseng Siberian ginseng (Eleuthero) Rhodiola rosea

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.

Introduction

Aside from training, nutrition may be the most important influence on athletic performance. However, in seeking a competitive edge, athletes are often susceptible to fad diets or supplements that have not been scientifically validated. Nevertheless, there is much useful research to guide the exerciser toward optimum health and performance.

Lifestyle Modification

Many athletes use exercise and weight-modifying diets as tools to change their body composition, assuming that a lower percentage of body fat and/or higher lean body mass is desirable in any sport. There is no single standard for body weight and body composition that applies to all types of athletic activities. Different sports, even different roles in the same sport (e.g., running vs. blocking in football), require different body types. These body types are largely determined by genetics. However, within each athlete's genetic predisposition, variations result from diet and exercise that may affect performance. In general, excess weight is a disadvantage in activities that require quickness and speed. However, brief, intense bursts of power depend partly on muscle size, so this type of activity may favour athletes with greater muscle mass. On the other hand, participants in endurance sports, which require larger energy reserves, should not attempt to lower their body fat so much as to compromise their performance.

Dietary Modification

Match intake to output - Calorie requirements for athletes depend on the intensity of their training and performance. The athlete who trains to exhaustion on a daily basis needs more fuel than one who performs a milder regimen two or three times per week. 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. Many athletes compete in sports having weight categories (such as wrestling and boxing), sports that favour small body size (such as gymnastics and horse racing), or sports that may require a specific socially accepted body shape (such as figure skating). These athletes may feel pressured to restrict calories to extreme degrees to gain a competitive edge. Excessive calorie restriction can result in chronic fatigue, sleep disturbances, reduced performance, impaired ability for intensive training, and increased vulnerability to injury.

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. A preliminary study of male athletes consuming at least 2.77 grams per pound of body weight per day showed no evidence of kidney impairment; however, the study was limited to one month, and evidence of long-term kidney problems associated with chronic protein loading were not examined.

Preliminary studies have suggested that increased protein intake may have biological effects that could improve muscle growth resulting from strength training, especially if liquid supplements (typically containing at least 6 grams of protein or amino acids in addition to varying amounts of carbohydrate) are taken either immediately after exercise or just before exercise. However, controlled studies have found no advantage of protein supplementation (up to about 100 grams per day or about 14 grams immediately following exercise) for improving strength or body composition as long as the diet already supplies typical amounts of protein and calories.

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. Some sport drinks containing 6 to 8% carbohydrates during exercise to support both carbohydrate and fluid needs, but these usually contain large amounts of fructose, which can cause gastrointestinal distress and, in the long term, impair the body's glandular system and hormone regulation. 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. However, it would appear 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.

Hydrate - 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 more complex problems. The American College of Sports Medicine's recommendations for fluid consumption by exercisers were last updated in 2007. Fluids should be consumed prior to, during, and after exercise, especially when extreme conditions of climate, exercise intensity, and exercise duration exist. Enough fluids should be consumed up to two hours before exercise begins to produce urine that is not too dark or concentrated. The amount of fluid that should be consumed during exercise will vary depending on many factors, including personal sweating rate, climate, and type and duration of exercise. Exercisers should generally drink to satisfy their thirst, and should also monitor changes in their body weight during exercise. If weight loss approaches 2% of body weight, then fluid consumption has been inadequate to prevent dehydration. After exercise, enough additional fluid should be consumed to equal 150% of weight lost (30 oz. or 850ml of fluid for each pound of weight loss). Some individuals may experience an increase in body weight during exercise; this can indicate that too much fluid has been consumed, which can lead to a potentially dangerous condition called hyponatremia (low blood sodium levels) even if electrolyte-containing sports drinks are used. A professional knowledgeable in sports medicine can help formulate an individualized plan for fluid consumption during exercise.

Sports drinks containing electrolytes are not necessary for fluid replacement during or after brief periods of exercise.

Fat utilization - 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. However, one controlled study found a small, significant benefit of ten days of high fat intake followed by three days of high carbohydrate intake.

The Glycaemic 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 hypoglycaemia and

prevent release of energy sources from fat cells. Some controlled studies of cycling endurance have found that eating a pre-exercise meal of low-GI foods (lentils, rolled oats, or a combination of low GI foods) is more effective than consuming high-GI foods (potatoes, puffed rice, or a combination of high GI foods), but most studies have found no significant advantage of low GI foods or fructose (a low-GI sugar) compared with other carbohydrate sources in a pre-exercise meal. After exercise, on the other hand, high-GI foods and beverages may be most helpful for quickly restoring depleted glycogen stores.

Nutritional Supplement Treatment Options

Creatine Monohydrate - ***15 to 20 grams daily for five or six days. 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. It may also increase exercise-related gains in lean body mass, though it is unclear how much of these gains represents added muscle tissue and how much is simply water retention.

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. Examples of this type of exercise include weightlifting; sprinting by runners, cyclists, or swimmers; and many types of athletic training regimens for speed and power. About 15 studies did not report enhancement by creatine of this type of performance. These have been criticized for their small size and other research design problems, but it is possible that some people, especially elite athletes, are less likely to benefit greatly from creatine supplementation.

Fewer studies have investigated whether creatine supplementation benefits continuous high- intensity exercise lasting 30 seconds or longer. Five controlled studies have found creatine beneficial for this type of exercise, but one study found no benefit on performance of a military obstacle course run. 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. Very little research has been done to investigate the exercise performance effects of long-term creatine supplementation. One study reported that long-term creatine supplementation improved sprint performance. Four controlled long-term trials using untrained women, trained men, or untrained older adults found that creatine improved gains made in strength and lean body mass from weight-training programs.

Creatine supplementation appears to increase body weight and lean body mass or fat-free mass, but these measurements do not distinguish between muscle growth and increased water content of muscle. A few double-blind studies using more specific muscle measurements have been done and found that combining creatine

supplementation with strength training over several weeks does produce greater increases in muscle size compared with strength training alone.

Multivitamin - ***If deficient: 100% Daily Value.*** 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. However, athletes who receive recommended daily allowances of vitamins and minerals from their diet do not appear to benefit from additional multivitamin-mineral supplements with increased performance.

Vitamin C - ***400 mg daily for several days before and after intense exercise.*** Most research has demonstrated that strenuous exercise increases production of free radicals, which can damage muscle tissue and result in inflammation and muscle soreness. Exercising in cities or smoggy areas also increases exposure to free radicals. Antioxidants, including vitamin C and vitamin E, neutralize free radicals before they can damage the body, so antioxidants may aid in exercise recovery. Regular exercise increases the efficiency of the antioxidant defense system, potentially reducing the amount of supplemental antioxidants that might otherwise be needed for protection. However, at least theoretically, supplements of antioxidant vitamins may be beneficial for older or untrained people or athletes who are undertaking an especially vigorous training protocol or athletic event.

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.

In most well-controlled studies, exercise performance has not been shown to improve following supplementation with vitamin C, unless a deficiency exists, as might occur in athletes with unhealthy or irrational eating patterns. Similarly, vitamin E has not benefited exercise performance, except possibly at high altitudes.

Casein Protein – ***1.5g per kg of body weight***. Casein protein is more slowly digested than other animal proteins, resulting in a slower yet more prolonged rise in blood levels of amino acids. This has led to speculation that casein may support protein synthesis by the body for a longer period of time compared with proteins, such as whey protein, that are more rapidly digested. Double blind studies have shown that adding protein supplements to a weight-training program improves gains in muscle mass and strength, but only one trial has compared using casein alone to other proteins for improving body composition and muscle strength. In this controlled trial, overweight men were given a low-calorie diet along with a weight training exercise plan for three months. Men who followed this plan and also took 1.5 grams per day of predigested casein protein per 2.2 lbs body weight gained more strength and lean body mass, and lost more body fat than did men using a similar amount of whey protein along with the same diet and exercise plan.

Alkalinising powder (Tri-Alkali) - ***135 to 225 mg per pound of body weight dissolved in 450ml of fluid and taken at least one hour before exercise***. 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. Some double-blind studies have found that sodium bicarbonate or sodium citrate typically improves exercise performance for events lasting either 1 to10 minutes or 30 to 60 minutes.

Coenzyme Q10 – ***60 to 100mg per day.*** 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.

Electrolytes - Electrolyte replacement is not as important as water intake. It usually takes several hours of exercise in warm climates before sodium depletion becomes significant and even longer for depletions of potassium, chloride, and magnesium to occur. Athletes participating in endurance exercise are at risk of developing hyponatraemia (low blood sodium levels) even when electrolyte-containing drinks are used. This condition is caused by fluid retention due to excessive drinking combined with natural reductions in kidney function during exercise, so some authorities caution against overdrinking during exercise, especially if the exerciser notices that his or her body weight goes up after prolonged physical activity.

Glutamine - ***5 grams after exercise, then again two hours later***. Glutamine appears to play a role in several aspects of human physiology that might benefit athletes, including muscle function and the immune system. 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, an effect of interest to some athletes because of the role of growth hormone in stimulating muscle growth. However, glutamine supplementation (30 mg per 2.2 pounds body weight) has not improved performance of short-term, high-intensity exercise such as weightlifting or sprint cycling by trained athletes. Double-blind trials giving athletes 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.

Iron – ***according to practitioner instruction.*** 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 with iron is usually unwise unless a deficiency has been diagnosed. People who experience undue fatigue should have their iron status evaluated with a blood test. Athletes who are found to be iron deficient will be typically given 100 mg per day until blood tests indicate they are no longer deficient. Supplementing iron-deficient athletes with 100 to 200 mg per day of iron increased aerobic exercise performance in some double-blind studies. A recent double-blind trial found that iron-deficient women who took 20 mg per day of iron for six weeks were able to perform knee strength exercises for a longer time without muscle fatigue compared with those taking a placebo.

Nitric Oxide - ***4 gram three times per day***. AAKG (arginine alpha-ketoglutarate) is a compound made from the amino acid L-arginine and alpha-ketoglutarate (AKG) a substance formed in the body's energy-generating process. It has been speculated that AAKG may increase production in muscles of nitric oxide, a substance known to have blood-flow-enhancing effects. A double-blind study gave trained weight lifters

either 4 grams of AAKG or a placebo three times a day during an eight-week weight-training regimen. AAKG had no effect on body composition but did improve measures of strength and short-term power performance.

Phosphatidylserine (PS100) - ***750 mg daily***. In a double-blind study of active young men, supplementation with 750mg of soybean-derived phosphatidylserine per day for 10 days increased the time the men could exercise until exhaustion by approximately 25%.

Probiotics – ***according to practitioner instruction***. In a double-blind trial, supplementation with a probiotic preparation reduced the frequency of upper respiratory tract infections in training athletes during the winter.

Quercetin - ***500 mg twice a day.*** In a double-blind study of trained athletes, the incidence of upper respiratory tract infections following a three-day period of intensive exercise was significantly lower in people who took quercetin than in those who received a placebo (5% versus 45%). The amount of quercetin used was 500 mg twice a day, beginning three weeks before, and continuing for two weeks after, the intensive exercise.

Soy - ***33 to 40 grams daily.*** In one preliminary study, elderly men participating in a 12-week strength training program took a liquid supplement containing 10 grams of protein (part of which was soy protein), 7 grams of carbohydrate, and 3 grams of fat either immediately following exercise or two hours later. Men taking the supplement immediately following exercise experienced significantly greater gains in muscle growth and lean body mass than those supplementing two hours later, but strength gains were no different between the two groups.

Arginine - At very high intakes (approximately 250 mg per 2.2 pounds of body weight), arginine has been found to increase growth hormone levels. However, at lower amounts recommended by some manufacturers (5 grams taken 30 minutes before exercise), arginine failed to increase growth hormone release and may even have impaired the release of growth hormone in younger adults.

Nonetheless, double-blind trials conducted by one group of researchers, combining weight training with either arginine and ornithine (500 mg of each, twice per day, 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.

Branched-Chain Amino Acids (BCAA) – ***up to 6g per day for one month prior to event.*** BCAA supplementation seems to be useful in special situations, such as preventing muscle loss at high altitudes and prolonging endurance performance 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.

Chromium ***– 200 – 400mcg per day.*** Chromium, in the picolinate form, has been studied for its potential role in altering body composition. Preliminary research in animals and humans suggest that chromium picolinate might increase fat loss and lean muscle tissue gain when used with a weight-training program. One group of researchers has reported significant reductions in body fat in double-blind trials using 200 to 400 mcg per day of chromium for six to twelve weeks in middle-aged adults.

Conjugated Linoleic Acid – ***1.8g per day.*** 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.

Copper and **Zinc** – ***30 – 50mg of zinc and 1 – 2mg of copper daily, taken at opposite ends of the day.*** In one double-blind trial 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. 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. Another 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.

L-Carnitine - L-carnitine is involved 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 or even marathon-level endurance exercise, anaerobic performance, or lean body mass in weight lifters.

Magnesium – ***up to 500mg daily.*** Magnesium deficiency can reduce exercise performance and contribute to muscle cramps. Controlled trials suggest that magnesium supplementation might improve some aspects of physiology important to sports performance in some athletes, although controlled and double-blind trials focusing on performance benefits of 212 to 500 mg per day of magnesium have been inconsistent.

Ribose - Ribose is a type of sugar used by the body to make the energy-containing substance adenosine triphosphate (ATP). Intense exercise depletes muscle cells of ATP as well as the ATP precursors made from ribose. Unpublished reports suggested that ribose supplementation might increase power during short, intense bouts of exercise. However, in a double-blind study, exercisers took four grams of ribose four times per day during a six-day strength-training regimen, and no effects on muscle power or ATP recovery in exercised muscles were found.

Vitamin B-Complex - The B-complex vitamins are important for athletes, because they are needed to produce energy from carbohydrates. Exercisers may have slightly increased requirements for some of the B vitamins, including vitamin B2, vitamin B6, and vitamin B5 (pantothenic acid); athletic performance can suffer if these slightly increased needs are not met.

Botanical Treatment Options

Asian (Panax) Ginseng - ***2 grams of powdered root daily or 200 to 400 mg daily of an herbal extract standardized for 4% ginsenosides.*** Extensive 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 little or 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 rosea - ***200 mg of an herbal extract, standardized to contain 3% rosavin plus 1% salidroside, taken one hour before endurance exercise***. 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.

For further information, contact:

Tracy S Gates

Director, PURE BIO LTD.
01403 730342
info@purebio.co.uk