

NUTRITIONAL SUPPLEMENTS AND DRUGS

Supplements are appealing to rugby players striving to improve performance and gain a competitive edge, and players are therefore an easy target for sport supplement companies. However, this industry is poorly regulated and as a result these companies make promises that are, in most cases, unsubstantiated. Despite this, there is an exponential growth in this market with new products finding their way onto the shelves. Furthermore, there is a real risk of supplements not containing the promised active ingredients or inadvertently containing harmful or illegal substances that may result in a doping offence.

Nutritional supplements include vitamins, minerals, protein and carbohydrate powders, fat-cutting remedies, sports bars and drinks/powders, to more specialised products such as amino acids, creatine, HMB and glutamine, either on their own or in combination with other ingredients. Some of these supplements may have a small but important performance-enhancing, or ergogenic effects. However, it is important to note that the benefits of supplements need to be kept in context with other performance enhancing factors (i.e. basic nutrition, genetics, sleep, rest, mental attitude, training, equipment, etc).

Some supplements may also have a practical role (e.g. players who lack appetite, have high energy requirements and need to gain weight, or for players who are injured or are prone to infection).

****Note:** in all cases supplements should only be prescribed by a sports dietitian or a sports physician and only once it has been determined that the habitual diet is unable to meet these additional requirements.

Rugby players need to be aware that they are liable and responsible for any and all substances appearing in their urine and blood and should they test positive for any banned substances their career may be ruined. Even supplements thought to be safe, may carry the risk of being contaminated with banned substances, since there is no proper regulation of the supplement industry worldwide.

SARU have thus compiled a POLICY DOCUMENT ON SUPPLEMENTS that is updated on a regular basis and the onus is on the player and supporting staff to stay informed at all times.

TABLE 3. PRACTICAL SUPPLEMENT GUIDE

CATEGORY / SITUATION	SUPPLEMENT	RECOMMENDED DOSE	SAFETY CONCERNS
LACK OF APPETITE/ HIGH ENERGY REQUIREMENTS	Liquid meal replacements* Carbohydrate (e.g. glucose polymer powders) and protein powders or mixtures (e.g. skim milk powder), sports drinks and gels and low fat sports bars	15-20% protein, 50-70% carbohydrate, low to moderate fat, vitamins and minerals. Sports bar: 50 – 65 g bar: 40 -50g carbohydrate, 5-10 g protein, low fat, low fibre	Over-reliance may lead to inappropriate replacement of whole foods. Choose lactosefree options if intolerant to lactose. Overuse may lead to weight gain.
BUILDING LEAN MUSCLE MASS	Extra carbohydrate & protein as above and creatine	Rapid-loading 20-25g divided into 4 doses for 3 days taken with 50 – 100 g high GI carbohydrate, then followed by 2 g/day maintenance Slow-loading if wanting to prevent rapid weight gain 2-5 g/day for 28 days with 50 – 100 g high GI carbohydrate and adequate fluid post exercise. Cycling protocol – 20-25g per day for 3-4 days every 3-4 weeks	Weight gain initially due to water retention and later protein synthesis. Anecdotal reports of nausea, gastric upset, headaches, muscle cramps and strains. Limit to players over the age of 18 or well-developed players. Avoid if renal impairment and or elevated BP or thermal stress and or if on nonsteroidal antiinflammatories
RECOVERY FROM TRAINING/MATCHES	High GI carbohydrate supplements, Carbohydrate and protein combinations, Creatine	Protein hydrolysate (e.g Peptapro)	Avoid free aminoacids as they cause GI disturbances and can be neurotoxic.

Note: All supplements are taken at players' own risk and the support team needs to be aware of medicolegal issues.

*Supplements do not compensate for poor food sources and inadequate diet.

*Keep to clinically based products such as Ensure, Nestlé Nutren Activ, as opposed to specific fat cutters or weight gainers that may be risky from a banned substance perspective.

So, how much protein?

Rugby players spend lots of money on protein powders, protein bars, protein shakes, and many types of amino acid supplements, all with the belief that they need massive amounts of protein to use as fuel for exercise and to help build proteins in muscles. It is argued by the supplement manufacturers that only high-quality proteins can provide optimal muscle growth or that only amino acids are absorbed into the blood quickly enough to maximally stimulate protein build up in muscles. As is often the case in the dietary supplements industry, there is only a little bit of truth and lots of rubbish in these claims.

If you are unable to provide yourself with enough protein eating traditional meals then consider supplementing with protein drinks. If you do consume more protein than you need it will not be absorbed by the body and will go straight through the system (an expensive visit to the toilet). Rugby players often need more protein in their diets than do inactive people. Except for a few players, the amount needed each day 1.2-1.6 grams of protein per kilogram of body weight (160gm for a 100kg player) is still very small. Moreover, this amount of protein can almost always be obtained from ordinary foods in the player's normal diet, without resorting to expensive protein supplements.

The maximal amount of protein required for rugby players probably does not exceed 2.5 grams of protein per kilogram of body weight every day. So, how can you choose ordinary foods that are high in protein? You can check the nutrition labels on the foods you are considering to get a good idea of how much protein will be contained in each serving. For example, a can of tuna packed in spring water contains about 2.5 servings of tuna when drained of water. Each serving contains about 13 grams of protein, so by eating the entire can of tuna, a player could consume $13 \times 2.5 = 32.5$ grams of protein. A large chicken breast will supply 72grams of protein

Steve Mac ([rugbyiq](#))

Understanding Creatine and It's use in rugby:

Steve mac (rugbyiq)

The culture of Creatine use by sportspersons may be relatively new to South Africa but certainly not to the U.S.A where it has been used for the last 10 – 15 years.

This culture was introduced into SA Rugby about 5 years ago and rugby players have on numerous occasions been quoted in the media about this issue. It is my belief that all rugby players, their clubs and their provinces should carefully evaluate the literature on the use of Creatine and objectively decide on their position.

In so far as the studies conducted on Creatine are concerned, very little has been published on the long-term use of Creatine. Almost all the information about Creatine has been derived from the short-term use (less than 8 weeks) and from anecdotal reports from sportspersons who had been using the product.

What is Creatine?

Creatine is an Amino Acid (protein) which occurs naturally in ones body, mostly in skeletal muscle.

It is considered a nutritional supplement and is therefore not on the List of Prohibited Substances and Methods of WADA and the IOC, nor is it an illegal substance in terms of the law. It is therefore readily available on the supermarket shelves, pharmacies and health food stores.

Creatine occurs naturally in foods, mostly in meat, fish and other animal products. A person consumes an average of 1-2 grams of Creatine daily in his normal diet: Vegetarians obviously consume much less Creatine.

The role of Creatine in the body lies mostly in skeletal muscle where it forms an integral part of an energy system causing muscle contraction.

What are the effects of Creatine/Are there any benefits?

The effects of Creatine include increased power and strength and increased muscle mass, giving rugby players a distinct advantage.

By decreasing the recovery time between repeated bouts of exercise Creatine allows the player to train more intensely and for a longer period of time hence becoming bigger and stronger. However, Creatine in isolation without a good exercise program and an adequate high carbohydrate diet will have no effect at all on muscle building.

Although in some studies Creatine Supplementation appears to enhance performance in repeated short bursts of activity such as stationary cycling (in laboratory) and weight lifting, there is not enough evidence to show that it works outside a laboratory setting.

Who uses Creatine?

Improved performance has been recorded in activities of short duration and high intensity e.g. repeated short sprints such as occur in rugby. Rugby players have therefore been using Creatine mostly for this reason. It has not, however, been found to be useful in endurance sports such as marathon running and long distance cycling.

Creatine use is common among professional athletes. Its use has now spread among college athletes, recreational athletes and even children. Its use by children is of growing concern because of the potential damage that can occur to growth plates and the imbalance that will exist with the increase in muscle mass and muscle strength

There are “responders and non-responders”. Creatine intake (loading) of 2 gram per day for 3 or more days has resulted in significant increase in Creatine levels of some individuals and not others.

Individuals with initial low Creatine levels appear to respond much better to Creatine loading eg. vegetarians.

What are the side effects?

Anecdotal reports have linked Creatine Supplementation with:

- Cramping (muscle and/or stomach)
- Dehydration
- Diarrhea
- Dizziness

Recent research done at the Sports Science Institute of South Africa has shown increased blood pressure in a number of individuals following Creatine use of a loading dose of 20g per day for 5 days and maintenance dose of 2g per day for 6 weeks

The April 25 1998 issue of The Lancet reported a case of kidney failure following Creatine use. The patient denied the use of any other medication apart from Creatine, loading dose 5g three times a day for 1 week and maintenance of 2g per day.

A second case report also describes kidney failure in a 20 year old man who was previously healthy prior to using Creatine 5g, 4 times per day for approximately 4 weeks before his onset of symptoms.

It must however be emphasised that it cannot be stated unequivocally that Creatine is harmful to the kidneys because no studies have been done to date on the long-term (more than 8 weeks) use of this product. It would however be prudent to avoid Creatine supplementation in all players with impaired kidney function.

Scientific evidence suggests that Creatine Supplementation up to 8 weeks has not been associated with any major health risks. The safety profile in its more prolonged use has to be established. Weight gain as a result of water retention has been reported.

What is the dosage of Creatine?

It is generally agreed that there should be a “loading” period of 3-7 days of 20gram per day and thereafter a maintenance dose of 2g per day. Any extra Creatine intake is simply excreted via the urine.

Advice to Players.

- Creatine builds muscle bulk and muscle strength but not in all users.
- There are certain advantages to the rugby player when using Creatine as prescribed viz. increased muscle mass and the ability to exercise more intensely and for longer periods.
- It has yet to be established that Creatine causes major improvement in performance in endurance exercise such as marathon running though in short duration exercises lasting less than 10 seconds such as short sprints in rugby, some improvement has been reported.
- Any dose above the prescribed dose is simply excreted via the urine.
- The prescribed dose of Creatine should not be exceeded.
- Should not be used by children under 17 years of age

- Creatine is classified as nutritional substance and therefore not regulated in the USA by the Food and Drug Administration nor by the Medicines Control Council in South Africa.
- Creatine's long term use safety profile has not been established.
- Creatine use is to be avoided in cases of renal impairment and/or elevated Blood pressure.
- Players using Creatine should stop immediately when side effects occur
- Players take Creatine at their own risk.

Recommendation to controlling bodies in rugby

I have attempted to be objective in my approach to Creatine.

There are the reported benefits in rugby players such as weight gain, increased muscle mass, increased power and improved performance in repeated short sprints with the short-term use thereof.

However, there are also the anecdotal reports of major side effects, which I feel, cannot simply be ignored.

The Medico Legal concerns need to be addressed. It is our duty to let players decide for themselves whether to take Creatine or not. We should endeavor to educate the players and assist them to make their own informed decision.

We should not freely distribute Creatine at training camps and elsewhere for fear of potential litigation should adverse effects occur or should all the anecdotal evidence of these adverse effects be confirmed.

DRUGS

Ignorance of the issues surrounding drugs in rugby may not be used as an excuse by players, coaches, trainers, selectors, managers, agents, team staff, officials, referees, doctors, physiotherapists, dietitians or any other persons participating in, or involved in the organisation, administration, promotion or coaching of sport – and the consequences of the World Anti-Doping Agency (WADA) anti-doping rules apply.

Coaches have an enormous influence on the attitudes and actions of their players, and therefore have a responsibility to use their influence wisely. They need to take a stand on doping and must educate themselves and their players about anti-doping regulations, as well the dangers and penalties of using banned substances.

GOVERNING BODIES

The World Anti-Doping Agency (WADA) is an independent, non-governmental organisation created through the collective initiative led by the International Olympic Committee, following the Lausanne Declaration on Doping in Sport (1999).

WADA's purpose is to:

- Protect the athlete's right to participate in doping-free sport and thus promote health, fairness and equality for athletes worldwide; and
- Ensure harmonised, co-ordinated and effective anti-doping programmes at international and national level with regard to detection, deterrence and prevention of doping.

WHAT IS DOPING?

Doping is defined as “the presence of a prohibited substance in an athlete's bodily specimen, or the use or evidence of the use of any substance or method that has the potential to enhance sports performance and which either poses an unnecessary risk of harm to athletes, or is otherwise contrary to the spirit of the sport”.

It is important to note that there are also other anti-doping rule violations, which include:

- Refusing or failing to be available to submit sample collection
- Failure to provide information about whereabouts and missed tests
- Tampering, or attempting to tamper with, any part of doping control
- Trafficking in any prohibited substances or prohibited method.

THE ROLES AND RESPONSIBILITIES OF PLAYERS

- Be knowledgeable of, and comply with, all applicable anti-doping policies and rules
- Be available for sample collection
- Take responsibility, in the context of anti-doping, for what is ingested and used
- Inform medical personnel of their obligation not to use prohibited substances and prohibited methods and take responsibility to make sure that any medical treatment received, including dietary supplements, does not violate anti-doping policies and rules.

THE ROLES AND RESPONSIBILITIES OF PLAYER SUPPORT PERSONNEL

- Be knowledgeable of, and comply with, all anti-doping policies and rules applicable to them or the athletes to whom they support;
- Co-operate with the Doping Control Programme
- Use their influence on player values and behaviour to foster anti-doping attitudes.
- They need to be aware of the signs and signals that denote actual or potential steroid abuse.
- Some signs to look for which may indicate doping:
 - *Abnormally heavy bouts of training
 - *Sudden increase in body mass and strength in an abnormally short period
 - *The player is in remarkably good shape despite an undisciplined lifestyle and little interest in diet and correct training
 - *Increased injury frequency, particularly in the muscular attachment points and tendons
 - *The player shows a keen interest in health foods and nutritional supplements and has an extensive knowledge of the effect of various medicines and doping agents.

SOME OF THE PROHIBITED SUBSTANCES AND THEIR SIDE-EFFECTS

Stimulants

Examples: Cocaine, amphetamines, ephedrine

Stimulants can be found in prescription and over-the-counter medications, as well as in herbal and nutritional supplements, and enable the body to perform above its fitness level for relatively long periods.

However, this can lead to injury to muscle, bone and soft tissue and put the heart under strain.

Stimulants act on the central nervous system, speeding up parts of the brain and body, increasing alertness and decreasing perceived levels of fatigue. Some stimulants suppress the appetite and are used in an attempt to reduce weight.

Side effects: Headaches, dizziness, nausea, palpitations, cramps, restlessness, problems with coordination and balance, irritability, confusion, aggression, clinical depression, eating disorders, psychosis, paranoia, compulsive behaviour, addiction. Another dangerous side-effect that may occur is an extremely fast pulse rate, which can cause cardiac arrest. In very hot and humid conditions, the use of stimulants can lead to heatstroke, collapse and possible death.

Narcotics

Examples: Diamorphine (Heroin), pethidine, morphine, methadone

Narcotic analgesics are strong painkillers and can be found in both prescription and over-the-counter medications. They are used to reduce or eliminate the pain of injury or illness, or to increase the pain threshold so that the athlete can continue to compete or train. There are stringent national and international legal restrictions regarding the supply and possession of many of these drugs.

Side-effects: Loss of concentration, balance and co-ordination; sleepiness, decreased breathing rate, nausea and vomiting, constipation, restlessness, mood changes. They are highly addictive, leading to physical and psychological dependency. Long-term abuse often results in reduced mental and physical capacity. An overdose may cause coma and breathing difficulties and can result in death.

Anabolic agents

Include exogenous and endogenous anabolic androgenic steroids.

*Examples: androstenedione, nandrolone, dehydroepiandrosterone (DHEA)
boldenone*

Anabolic androgenic steroids are a synthetic version of the male hormone testosterone, and are often used to improve sporting performance by increasing muscle size, strength and power, thereby allowing the athlete to train at a greater intensity and for longer periods. The anabolic effects can accelerate the growth of muscle and bone. The androgenic effects impact on the development of the male reproductive system and male sexual characteristics. They cause mood-altering, chemical changes in the brain and increase aggression and competitiveness.

Side-effects: Liver disease, certain forms of cancer, kidney damage, increased risk of heart disease, hardening of the arteries, depression, paranoia, aggression, stunted growth in adolescents, musculotendonous injuries, severe acne of the face, neck and shoulders. In males, they can cause the development of breast tissue and premature baldness, atrophy of the testes, decreased sperm count, infertility, enlargement of the prostate, and prostate cancer.

2 –Agonists

These are commonly used to prevent or treat asthma. While most beta-2 agonists are banned there are exceptions, which are permitted by inhalation. If required, written notification from a recognised medical practitioner should be submitted to the relevant authority. When given systematically, beta-2 agonists may have powerful anabolic effects (increased muscle size, strength and power).

Side-effects: Palpitations, headaches, nausea, muscle cramps, anxiety, restlessness and insomnia, rapid heart rate, dilation of the peripheral blood vessels.

Diuretics and other masking agents

Examples: chlortalidone, furosamide, spironolactone, triamterene.

Diuretics are used to increase fluid loss from the body in order to decrease weight and are often used by athletes competing in sports with weight categories. They are also used in an attempt to dilute the urine so that banned drugs may not show up in a doping test.

Side-effects include dehydration, headaches, dizziness, nausea, muscle cramps, loss of co-ordination and balance. Severe dehydration can cause kidney and heart failure. Masking agents are prohibited. They are products that have the potential to impair the excretion of prohibited substances or to conceal their presence in urine or other samples used in doping control.

Masking agents include but are not limited to: diuretics, epitestosterone, hydroxyethyl starch, probenecid, plasma expanders.

The Complete Prohibited list of substances and methods is updated annually and can be viewed/ downloaded from:

THE SAIDS WEBSITE <http://www.drugfreesport.org.za/> OR

THE WADA WEBSITE <http://www.wada-ama.org/>

Queries: Drug-Free Info Hotline (021) 448 3888

• Information on inadvertent doping and therapeutic use exemptions as well as testing procedures can be found on these websites.

Supplement Grouping	Definition
<p>Group A</p>	<p><u>This group includes supplements and sports foods that provide a performance benefit in sport-specific and individual-specific situations or provide a useful and timely source of energy and nutrients in an athletes diet or are of medical/therapeutic benefit</u></p> <p>bicarbonate, beta-hydroxy-beta-methylbutyrate (HMB), caffeine, calcium, creatine, carbohydrate powders and gels, glucosamine and chondroitin, intramuscular iron, phenylephrine, intramuscular vitamin B12, liquid meal replacements, melatonin, recovery formulas, sports & energy bars; skim milk powder, sports drinks, specific vitamins and minerals.</p>
<p>Group B</p>	<p><u>This group includes supplements currently lacking substantial proof of beneficial effects or have no proof of beneficial effects in sportspersons.</u></p> <p>This group contains the majority of supplements including many herbs and herbal extracts* promoted to sportspersons. These supplements enjoy a cyclical pattern of popularity and use, but have not been proven to enhance sport performance. In some cases these supplements may impair sports performance or health:</p> <p>arginine, bee pollen, branched chain amino acids (BCAA's), colostrum, CLA (conjugated linoleic acid), carnitine, cordyceps, cytochrome C, coenzyme Q10, chromium picolinate, choline, Echinacea, ferulic acid, ginseng, glycerol, glutamine, ginkgo biloba, gamma-oryzanol, intravenous iron, inosine, lysine, ornithine, oxygenated water, Protivity (Microhydrin), pyruvate, ribose, vitamin B12 injections, spirulina.</p> <p>* Note that many supplement products sold by network marketing schemes contain ingredients from Group B</p>
<p>Group C</p>	<p><u>Supplements that are prohibited for use by the World Anti-doping Agency (WADA).</u> This list includes prohormone supplements and stimulants. The prohormone supplements can be grouped into testosterone precursors and nandrolone precursors.</p> <p>TESTOSTERONE PRECURSORS: Testosterone precursor hormones provide the necessary materials to increase the production of testosterone in the body. dehydroepiandrosterone (DHEA); androstenedione; androstenediol; The ingestion of testosterone precursor hormones may result in a positive doping test. This is defined as a testosterone:epitestosterone (T:E) ratio > 4:1 and constitutes a positive test. Recent research has found that supplements in categories A, B may be contaminated with testosterone precursors. If testosterone prohormones are ingested inadvertently, the T:E ratio may remain elevated for up to 24 hours. <i>The effect of tribulus terrestris, herbal testosterone supplements, zinc magnesium antioxidant (ZMA), ecdysterone (suma) on drug testing results are unknown. These substances, although by themselves not necessarily prohibited, may often be used in conjunction with androstenedione and DHEA (anabolic precursors) which are banned.</i></p> <p>NANDROLONE PRECURSORS Nandrolone precursors may increase the production of nandrolone in the body. 19-norandrostenedione; 19-norandrostenediol Nandrolone precursor steroids may be found in small amounts in other commonly used supplements. If a nandrolone precursor steroid is ingested, this may be converted to nandrolone by the body. The nandrolone is broken down to 19-norandrosterone which can be found in the urine. The athlete will have a positive drug test if the concentration is greater than 2 ng.ml⁻¹ in males and females. The urine may remain positive for 7-10 days.</p> <p><u>Negative side effects of prohormone steroids:</u> water retention, gynecomastia, male pattern balding, testicular atrophy, prostate cancer, hypertension, decreased HDL cholesterol, abnormal liver function tests, mood and behavioral changes.</p> <p>STIMULANTS Stimulants may be detected in the urine for varying periods of time. The WADA prohibited substances and methods S6 has a comprehensive list of banned stimulants and concentration levels – e.g. strychnine is prohibited. The FDA has notified manufacturers of its intent to ban the sale of dietary supplements containing ephedrine alkaloids but there may still be athletes with stock of supplements (e.g. fat burners) that contain Ephedrine or it may inadvertently be present in some products. Ephedrine and methylephedrine is prohibited in a concentration of ≥ 10 µg/ml. Note: ingestion of dietary supplements containing Sida herbs (e.g. Sida cordifolio) may contain ephedrine alkaloids and thus may cause a positive drug test result.</p>

Group A nutritional supplements

Type of Supplement	Dose/composition	Rationale/Sport –related use	Concerns/ Safety/ Side-effects
Broad spectrum multi-vitamins and mineral supplements	1-1.5 x RDAs of vitamins and minerals	Support for low energy or weight loss diets, restricted variety diets, unreliable food supply (e.g. travel)	In absence of deficiency may not improve performance
Liquid meal replacements (e.g. Ensure, Nestle Nutren Active Complan, Nutren 1.0)	1-1.5 kcal/ml; 15-20% protein, 50-70% carbohydrate, low to moderate fat, vitamins and minerals – 500-1000 ml supplies RDA)	Easily prepared meal replacement for lack of appetite, high energy requirements, weight gain, weight management for weight-making sports (1-3 days pre-weigh in), low bulk pre-event meals, post-exercise recovery, travel, injury	Over-reliance may lead to inappropriate replacement of whole foods. Choose lactose-free options if intolerant to lactose.
High protein meal replacement formulae	42-55% Protein; 25-35% carbohydrate; low fat to fat free (varying vitamins and minerals)	Easily prepared meal replacement for athletes not able to meet protein needs via food (e.g. some vegetarians); or for athletes with additional protein requirements (e.g. growth spurts; injury)	Expensive. May inappropriately replace whole foods or may displace carbohydrates; risk of protein overload; may lead to excess body fat
Skim milk powders (e.g. Elite, Protea, Klim)	35% protein; 50% carbohydrate, fat-free (may have vitamins added)	Economical and ideal to use to fortify food and drinks for weight gain, recovery, lack of appetite	
High carbohydrate supplements Sports drinks	Sports Drinks (5-8% carbohydrate 10-25 mmol sodium, 3-5 mmol potassium)	High carbohydrate requirements e.g. heavy training, carbo-loading, pre-during and post-exercise; weight gain, lack of appetite, convenience (portable),	Overuse may lead to weight gain or disturb the ratio of macro-nutrients; gastro-intestinal upset if concentrations too high (e.g. powders, some gels); gels should be consumed with

<p>High carbohydrate sports drinks</p> <p>Sports gels</p> <p>Powders</p> <p>Sports Bars</p> <p>Cereal bars (e.g. Bokomo breakfast bars)</p>	<p>10-25% carbohydrate concentration with added electrolytes</p> <p>Gels (30-40g sachets: ~25g carbohydrate/sachet, electrolyte, vitamin and mineral content varies).</p> <p>Powders (glucose polymers-flavoured or plain), may have added vitamins, minerals.</p> <p>Bars: 50-65g bar: 40-50g carbohydrate, 5-10g protein, low fat, low fibre (may have added vitamins and minerals).</p> <p>Per 30g bar: 16-25 g carbohydrate, 1.5-2 g protein; 1-5 g fat; 1-2 g fibre (may have added vitamins and minerals).</p>	<p>powders can be mixed to desired concentrations or added to food/drinks; gels provide easily digested carbohydrate for sports with lower fluid requirements or when it is impractical to eat whole foods; bars are a compact source of energy and are non-perishable, the lower fibre bars are useful for athletes who experience gastro-intestinal problems during exercise</p>	<p>adequate fluid to meet hydration needs; these products may contain other compounds that may not be safe/legal or that may cause gastro-intestinal problems (e.g. medium chain triglycerides)</p> <p>Note also that sodium deficiency does not occur during exercise so supplementation is unnecessary (although it may improve taste of the drink) and (ii) low blood sodium concentrations sometimes considered to indicate a sodium deficiency are due to water overload (hyponatremia) and cannot be prevented or treated by drinking solutions with low sodium concentrations.</p>
<p>Protein supplements</p> <p>(e.g. Whey powders)</p>	<p>Varying concentrations (30-80% protein by weight)</p>	<p>Weight gain (but needs to be consumed with adequate carbohydrate)</p> <p>Injury</p>	<p>Expensive, may be unnecessary if balanced diet appropriate calories is consumed; inappropriately used can lead to fat weight gain and calcium excretion</p>
<p>Recovery formulas</p> <p>(or higher protein sports bars consumed with a sports drink)</p>	<p>60-67g carbohydrate, 10-30g protein (whey, casein and soy); electrolytes (sodium and potassium); low fat.</p>	<p>Convenient source of rapidly absorbed carbohydrate and low fat protein to stimulate energy storage and</p>	<p>Choose according to individual taste preference and tolerance.</p> <p>Timing: Should be ingested within 40-</p>

		repair of damaged muscle. Sodium and potassium help maintain electrolyte balance and improve hydration	60 minutes of completing exercise to optimise the uptake of essential nutrients.
Prebiotics and Probiotics	E.g. yoghurts containing min. 1x 10 ⁸ viable CFUs/100ml and ≥ 1500 mg pure FOS or GOS per daily serving	Immune and gut benefits (e.g. for athletes with traveller's diarrhoea, Irritable Bowel Syndrome, or on anti-biotics)	
GROUP A SUPPLEMENTS THAT REQUIRE INDIVIDUALIZED SPECIALIZED PRESCRIPTION			
Creatine	<p><i>Rapid loading protocol:</i></p> <p>20-25g/d divided into 4-5 doses for 5 days taken with 50-100g high GI carbohydrate (eg a sports drink (with glucose; not a low GI fruit juice (or fructose-rich drink)</p> <p><i>Slow-loading protocol (useful if wanting to avoid rapid increases in weight)</i></p> <p>3g – 5g/day for 14-21 days with 50-100g high GI carbohydrate ((eg a sports drink (with glucose; not a low GI fruit juice (or fructose-rich drink).</p>	<p>Resistance training, repeated bouts of high intensity sprints separated by short rest periods.</p> <p>Effects of creatine include fuel provision, buffering of H⁺ ions, transport of ATP, aiding recovery allowing for better training adaptations.</p>	<p>Weight gain initially due to water retention and later protein synthesis.</p> <p>Anecdotal reports of nausea, GI upset, headaches, muscle cramps and strains.</p> <p>No reported side-effects on liver, blood or kidney function with <u>2</u> year follow up however avoid if renal impairment and/or elevated BP or thermal stress and/or if on non-steroidal anti-inflammatories.</p> <p>May be advisable to break from creatine every few weeks.</p>
Sodium bicarbonate, lactate or citrate	e.g., 0.3 g sodium bicarbonate per kg body mass (~ 20g)	May benefit if performing activities near	Gastro-intestinal upset: should be practised in

loading	1 hour pre-event + 1-2 litres water (can reduce subsequent doses if participating in heats or finals on same or successive days).	maximum intensity lasting about 1-10 minutes. The bicarbonate binds with hydrogen ions and prevents acid build up.	training to assess benefits and side-effects. Side-effects may vary according to compound.
HMB (beta-hydroxy-beta-methylbutyrate)	1.5g – 3g per day	In the early stages of training may reduce the amount of exercise related muscle damage (mechanism unknown); small reduction in body fat %, small increase in muscle mass gain. May have an additive effect on body composition when combined with creatine.	No recognised side effects; results from long term studies still needed.
Sick packs, Immune Boosters, anti-oxidants	Antioxidant combinations (e.g. 18 mg beta-carotene, 500-1000 mg vitamin C and 60-350 mg vitamin E) glutamine (5-8g/day) and zinc (50mg/day). To be used short-term (5-7 days).	Use short-term to boost immune function during periods intense training and altitude training.	Excessive and continuous intake of these nutrients may be counter-productive and damage health.
GROUP A MEDICAL SUPPLEMENTS :			
Vitamin B12	For treatment of pernicious anaemia, may be used as a prophylactic in some vegetarians, may be necessary after gut surgery. 250-1000 mcg/ml	Proper assessment of risk factors; no proven performance enhancement effects unless pre-existing deficiencies.	Rare allergic reactions to B12. Excessive intakes of some vitamins may impair the absorption of other nutrients; some vitamins at high intakes can be toxic.
Iron	Ferrous	Only if proven	Gastro-intestinal

	<p>sulphate/gluconate/fumarate.</p> <p>100-300 mg elemental iron/day for 3-6 months with on-going monitoring.</p> <p>Vitamin C increases iron absorption in gut (may be prescribed with 500mg Vitamin C and/or with folic acid).</p>	<p>iron deficiency on blood tests. Risk factors for deficiency include: vegetarian diets, heavy menses, low energy diets.</p>	<p>upsets; constipation; haemochromatosis; may interfere with zinc and copper absorption.</p>
Calcium	<p>Calcium carbonate/phosphate/lactate</p> <p>500-1000mg/day depending on dietary intakes usually taken between meals or at bedtime.</p>	<p>Calcium supplementation in a low-energy or low dairy food diet; treatment or prevention/osteoporosis or bone stress injuries.</p>	<p>Calcium supplementation does not guarantee bone status in absence of adequate estrogen/progesterone status. Will not correct poor diet.</p>
Glucosamine sulphate and chondroitin sulphate	<p>800-1500 mg/day glucosamine sulphate.</p> <p>200 mg chondroitin sulphate.</p> <p>For minimum of 3 months</p>	<p>Repair of articular cartilage; glucosamine has mild-anti-inflammatory properties.</p>	<p>Proven benefit in treatment of osteoarthritis (hip and knee). No evidence of benefit in athletes without cartilage damage. Long-term effects are still unknown.</p>
Melatonin	<p>3 mg stat (for sedative effect)</p> <p>3 mg daily for 5 days (to restore diurnal rhythm)</p>	<p>Main benefit is to restore the normal diurnal rhythm (recognition of night and day) mainly with eastward flights. Sedative effect variable and large individual differences</p>	<p>May cause headache and dizziness. Should not be used with sleeping pills, warfarin, or by those with a history of migraine or epilepsy. Allergic reactions occur in 1/240 users of melatonin</p>

○ [RDA = Recommended Dietary Allowance](#)

- Note: branded food products cited in the table are merely examples and are by no means an endorsement of the product.

CONCLUSIONS AND RECOMMENDATIONS

1. Supplements should only be taken when there is proof that the diet cannot provide the quantities of nutrients needed. A nutritional evaluation by an HPCSA (Health Professions Council of South Africa) registered dietician (with sports nutrition experience) should determine if any deficiencies are present in the diet and supplements can then be supplied accordingly. This evaluation should take into account body composition goals, dietary and medical history, food practices and preferences, training and competition nutrition requirements and budgetary constraints.
2. Dosages of supplements need to be calculated to provide the correct amount, thus avoiding under or overdosing.
3. Individuals may respond differently to supplements and this needs to be taken into consideration. For example, 30% of athletes may not respond to creatine supplementation and supplements may be tolerated differently by different persons. To avoid problems, and assess responses, the supplements used should be tried and tested well before a major competition.
4. Supplements required in clinical situations require a proper medical diagnosis and again should only be prescribed by the sports physician and dietician in writing. Athletes are also reminded to request written prescriptions for supplements. Fitness coaches and conditioning staff should not prescribe any supplements.
5. Sports supplements are not any safer than vitamins and minerals and no persons under the age of 18 should take any sport-specific supplements without the advice of a sports physician or dietician.
6. All supplement labels should be carefully studied and the ingredients noted. Look for hidden relationships between ingredients (e.g. caffeine and guarana), un-stated ingredients (e.g. “fat-burning” and “muscle building” supplements that may contain hidden banned stimulant products or anabolic agents) and avoid the prohormone supplements that are banned by sporting federations. Even small amounts of a contaminant (e.g., 0.02% nandrolone in a supplement) can cause a positive test.
7. Presently there is no way to recommend with certainty that one particular brand is safer than another. Even if manufacturers of supplements claim that their supplements have been ‘approved’ or ‘verified’ or ‘tested to be free of contaminants’ – these are generally *self-regulatory systems* that are not fool-proof. We recommend that for every supplement purchased the athlete request the supplier to provide a quality control certificate **as well as legally binding** documentation listing all contents of ALL the different products that they produce and that the company accepts full liability for a positive doping test as a result of the use thereof. This guarantee document should:
 - Be on a company letterhead.
 - Be signed by management and dated.
 - Include contact details for the person responsible for issuing the guarantee.

Address the athlete directly by name, and not be addressed generally e.g. “To whom it may concern”.

SARU and SAIDS does not accept any liability for the consequences of an athlete taking any supplement product.

Compiled for SA Rugby by:

Dr Ryan Kohler

Mrs Shelly Meltzer RD (SA)

Dr Ismail Jakoet

Professor Tim Noakes

Date: December 2006.