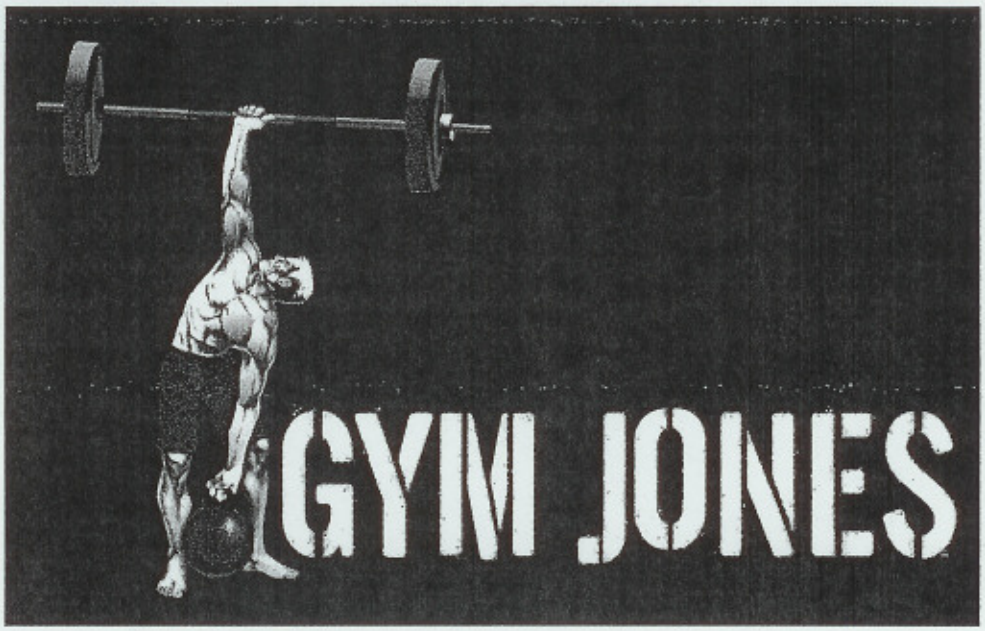
© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED



Basic Nutrition Rules

Supplements for Performance, Cold Weather & High Altitude

Any questions? Contact: Mark Twight at *mark@gymjones.com*
Logan Hood at *logan@gymjones.com*

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

Ten Basic Nutrition Rules

1. Eat small meals and/or snacks frequently throughout the day (minimum of six feedings per day).

2. Eat protein with every meal.

3. Eat carbohydrates with every meal (ideally from fruit/vegetable sources). Post-training meals may be derived from "science diet" sources.

4. Eat fat with every meal, ideally from MUFA and PUFA sources. Be aware of saturated fats (meat, animal sources) but don't avoid them entirely. Do not eat trans-fats (hydrogenated oils, etc).

5. Don't drink calories. Do not drink soda or so-called "sports drinks". Instead drink water, tea, coffee, etc. That said, intelligent hydration drinks may/must be used during certain training sessions and performance.

6. Eat real food for most meals (performance nutrition and post-training meals may be derived from "science diet" sources).

7. Take a few simple supplements: fish oil (3-6g/day), multi-vitamin (twice/day), anti-oxidant (more if you train endurance), vitamin C (Linus Pauling outlived most of his critics), water (drink a lot).

8. Alcohol consumption is not separate from nutrition, be smart about it.

9. Caloric intake depends on the goal (increase or decrease mass).

10. Carb-protein-fat ratios: until the first eight points are respected the majority of the time, consistently over several months, tweaking the details isn't worth the attention or effort. As Dan John says, "if you didn't eat breakfast don't ask me about nutrition."

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

Carbohydrates, fat and protein fuel exercise but simply cleaning well-balanced meals off of your plate will not support an athlete's nutritional needs. Athletic performance and recovery may be improved by supplementing food with vitamins, minerals and herbs. However, dumping handfuls of supplements down your throat just makes your pee more expensive. If there is no demand for a particular supplement the body excretes what ever is extra.

Vitamins

The Recommended Daily Allowance (RDA) was established for sedentary people, not athletes. Disregard it. If you train you need more of a variety of supplements than the government recognizes. On the other end of the spectrum a 24-hour non-stop effort is beyond the experience of most sports scientists who study nutrition. There is too little experience in the field (of ultra endurance) to establish exact doses, and they vary due to biochemical individuality anyway.

The Basics

Individuals and the demands of their workloads respond differently to vitamin and mineral supplements. Without specific individual testing you cannot know which vitamins and minerals you need to supplement, however I will make a few blanket suggestions based on experience and research.

1) Take a reasonably priced multi-vitamin and mineral supplement twice each day (Hammer Premium Insurance Caps, FSI multi-vitamin). This should cover deficiencies that result from eating processed food (that is relatively devoid of vitamins and minerals).

2) Omega 3 Fats. Our diet is rich with saturated fats and Omega 6 fatty acids, supplementation with Omega 3 fat helps balance this (Omega 6 to Omega 3 ratio should be 2:1), lowers blood triglycerides, and thins blood, which reduces stress on vascular system. 3-6g/day, perhaps more.

3) Take supplemental antioxidants. Converting sugar and fat to energy via oxidation is clean and accounts for 95% of oxygen consumption. Energy production via the *univalent reduction pathway*, which accounts for 5% of O2 consumption, creates free radicals that damage every cell they touch. Anti-oxidants combat these little devils. Buy them pre-combined. Anti-oxidants (vitamins C, E and alpha-lipoic acid) have been shown to increase blood oxygen saturation. Antioxidant supplements should contain at minimum: vitamin C, vitamin E, L-glutathione, and Selenium. Coenzyme Q-10, n-acetyl cysteine and beta-carotene may also help. Melatonin is a very powerful antioxidant and is also useful to aid sleep.

4) Intense exercise can crash your immune system. To support it, increase your intake of vitamin C. Nobel Prize-winner Linus Pauling recommended doses of several grams per day. Many disagreed but he outlived most of them. When training hard or on a route, 1-2 grams twice per day is recommended (although the Colgan Institute "uses 2-12 grams of vitamin C with athletes" daily). There is no toxicity associated with huge doses but such may upset your stomach (this may be prevented by using a C supplement buffered with magnesium).

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

Supplements: While not considered absolutely necessary components of a healthy diet, certain supplements have been proven to aid athletic performance. If it were otherwise no Olympic athletes would be taking them. However, no one in the room is a national or Olympic caliber athlete and no one in the room ahs their diet, training and recovery so finely tuned that the extra 1-2% any over-the-counter supplement might provide is going to make a difference.

I have spent a lot of money on supplements in my life. I have consciously added or subtracted one at time and used them for long enough to determine whether there was an effect or not. These days I don't waste money on anything that I am not sure is helping. I know the following supplements work based on my own experience and that of others. There is supporting science for many of these as well. The question is whether you can ensure the quality of the supply, and whether or not a bigger improvement in health and fitness might come from other, more difficult practices (like losing weight). There is no free lunch.

Supplements for Athletic Performance

1) Creatine Monohydrate can help develop explosive strength and extra muscle mass. It is also an insulin-independent source of short-term energy ("short" being the operative word). During anaerobic exercise supplies of creatine phosphate in the muscle are quickly depleted, although the body does resynthesize it quite rapidly. Within the first second of anaerobic work, 80% of the energy used comes from creatine phosphate and 20% from anaerobic glycolysis (glycogen oxidation). 2.5 seconds into the work energy production is split 50-50 between the systems. A continuous muscular contraction of more than 6 seconds will consume a muscle's supply of creatine phosphate. Supplementing with creatine Monohydrate (which contains more actual creatine than creatine phosphate does, and is also less expensive) saturates the muscles with creatine. Artificially increasing creatine stores will extend the time before creatine reserves are expended, thus improving anaerobic (power) endurance. Creatine supplements may increasing cramping and muscle soreness.

No benefits have been suggested for aerobic performance, and many tests show that creatine has deleterious effects on aerobic and endurance performance.

Creatine Monohydrate has been associated with heart attacks in athletes who would not otherwise be susceptible. This may have something to do with fluid retention caused by Creatine supplementation, which can cause an abnormal increase in blood pressure. Athletes engaging in high heart rate activities should not supplement with creatine.

2) Glutamine is a non-essential amino acid accounting for 50% of all free amino acids in the muscles. During and after hard exercise muscles release huge amounts of glutamine into the blood. Exercise-induced glutamine loss is countered by using other amino acids to make new glutamine. If these amino acids are not available in the blood the body breaks down muscle amino acids to find them. This results in the production of ammonia, which is highly toxic, and a cause of premature muscle fatigue. Glutamine supplementation immediately following effort or prior to sleep helps to repair muscle damage and counter catabolism. Glutamine powder degrades into ammonia when mixed with water if it stands for more than 30 minutes so once mixed drink it right away.

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

Sources: FSI Nutrition Glutamine Edge (5g glutamine per serving), Hammer Recoverite (3g glutamine per serving plus 75/25 carb to protein ratio). Use these products after training or prior to sleep.

During effort we supplement with ornithine and alpha-ketoglutarate, which act as ammonia scavengers and the body can make glutamine from both of them. Ornithine alpha-ketoglutarate supplementation increases the body's glutamine reserves and acts as a powerful anti-catabolic. OKG has demonstrated marked anabolic and anti-catabolic effects in healthy persons and individuals that have sustained trauma. OKG stimulates the release of insulin and growth hormone while raising levels of amino acids and their metabolites, presumably making them available for protein synthesis[1]. To preserve muscle during intense exercise or during a multi-day effort, take 2-4 grams of ornithine alpha-ketoglutarate 3 times per 24-hour period. Do not take straight glutamine powder before or during exercise because it will add to the ammonia burden but OKG is OK.

3) Caffeine is an effective stimulant. It causes the pituitary gland to release a hormone that tells the adrenal gland to produce adrenalin, which makes the heat rate and blood pressure rise, and sugar is released into the bloodstream to prepare the individual for action. Due to its stimulant effect caffeine can improve performance during brief intense effort (any stimulant can modify one's perception of effort).

Caffeine is an ergogenic aid: 3-10mg per kilogram of bodyweight prolongs time to exhaustion, increases free fatty acid supply to the muscles, which spares muscle glycogen, delaying fatigue, reduces perceived exertion, stimulates the nervous system, etc. USOC regulations state that 12mcg/ml of urine is illegal. One may reach this level by drinking for cups of drip coffee. Dosage: 6oz drip coffee contains 100mg of caffeine, one shot of espresso contains 50mg of caffeine, 12oz drip coffee and one Vivarin tablet each contain 200mg, and one package of GU (carbohydrate gel) contains 25mg of caffeine.

Caffeine remains in the blood for 6-10 hours, which can affect sleep and recovery. Frequent caffeine intake causes the body to "run hot" all of the time and there is a cost. The caffeine receptors in your body to habituate to the drug, meaning you eventually need more caffeine to feel a similar effect. Discontinuing the use of caffeine for 10-14 days cleans out these receptors and increases their sensitivity.

4) Electrolytes: During long efforts it is wise to take some sort of electrolyte support especially if fluids are lost through sweat and increased respiratory exchange and the replacement drink of choice is water. E-Caps Endurolytes are a combination of calcium, magnesium, potassium and sodium that can improve neuromuscular contraction and prevent cramps. E-Lyte contains sodium, potassium and magnesium, but no calcium, which can cause a bad stomach reaction in some individuals. Dosage depends on activity level, atmospherics (temperature, humidity and altitude), and individual characteristics (heavy sweat, etc). See the literature that accompanies each product for details. Electrolyte supplements can make the difference in maintaining the pace that achieves the

[1] Cynober L., C. Coudray-Lucas, J. deBandt, J. Guechot, C. Aussel, M. Salvucci, et al, **J Am Coll Nutr**. 1990:9:2-12, Cynober, L. **Nutrition** 1991:7:313-322, Cynober, L., M. Vaubourdolle, A. Dore, and J. Giboudeau **Am J Clin Nutr** 1984:39:514-519

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

goal or falling short; it was essential for my partner in the Trofeo Mezzalama ski mountaineering race as he began cramping two hours into the eight-hour effort. He took four E-Caps, the cramps disappeared in about 20 minutes and he was good for the rest of the race.

5) Tyrosine, a precursor to dopamine may be supplemented during long efforts to improve cognitive function. This supplement helps keep you feeling sharp without getting "speedy" and may be used for long periods of time, apparently without side effects. A June 1998 paper published by the Uniformed Services University of the Health Sciences Department of Military and Emergency Medicine Human Performance Laboratory recommends, "150 mg/kg body weight, 1 to 2 hours prior to the designated exposure" to reduce "stress-induced cognitive performance degradation." My personal experience with the product has been good. I place two packets of FSI Nutrition Neuro-Edge in 16oz of water and sip during the course of an 4-10 hour period.

6) Phosphates: Both anaerobic and aerobic exercise release muscle phosphates into the blood. Low blood phosphate levels hinder athletic performance. Higher blood phosphate levels are found in athletes than in sedentary people because the body responds to training by increasing its phosphate levels. The body doesn't produce phosphates but food can't supply an adequate quantity for athletes. Pills are the answer. Phosphate supplementation reduces lactic acid levels in the muscles, and in several tests has improved VO2 max by 6-12%. Similar loading has improved anaerobic (power) performance by up to 17%.

During training or performance take 1g of sodium phosphate every 3-4 hours during exercise. Loading of 4g per day prior to the climb will ensure you start off with high levels. More than 1.5g taken at once can upset the stomach or cause diarrhea. Gulf Performance Group's Stim-o-Stam is a fine source as is E-Caps "Race Day Boost". FSI Nutrition Phosphate Edge is also good. Supplement phosphates in cycles for the best effect "on the day."

7) *Eleutherococcus Senticosus* is part of the Aralia family of herbs and is often erroneously identified as Siberian Ginseng, which although in the same family, is a distant, less effective cousin. Genuine, pure EC harvested properly costs more per ounce than gold. Tests done in the former Soviet Union combined with nine years of personal experience and that of other athletes confirms great benefits from *Eleutherococcus Senticosus*. Many studies show improved cognitive function and accelerated reflexes, a few studies showed increased endurance though these claims are contradicted by other experiments. Over 1000 studies were done on EC in the former Soviet Union, and Ben Tabachnik (strength coach for the Russian Track & Field team) used it in adaptogen combinations given to his athletes ... and they have some gold medals ... and that's good enough for me. I have used a daily low dosage of EC since 1995 with beneficial results.

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

Extracts of Eleutherococcus Senticosus have improved immune-system functioning in high-quality research.[2] *"The most salient feature in the verum group was a drastic increase in the absolute number of immuno-competent cells, with an especially pronounced effect on T lymphocytes, predominantly of the helper/inducer type, but also on cytotoxic and natural killer cells. In addition, a general enhancement of the activation state of T lymphocytes was observed."* A lot of good research papers may be found on this subject.

To determine EC's effect on adaptation to high altitude, it was tested extensively on both laboratory animals and people. Lab rats were tested on a simulated ascent to extreme altitude (taken there in a pressure chamber). Their "time to expiration" was recorded. Follow-up tests made on other rats given prophylactic doses of EC, showed their "time to expiration" increased by as much as 60%. These tests were replicated, with reproducable results many times over. My personal nine years' experience, using various partners as my "control group" prove that EC works and works well. It has virtually no side effects, although the body may adapt to high doses, indicating the need to take the supplement in cycles. When looking for pure, genuine EC, it is "buyer beware", but the stuff does exist. PrimeQuest (also known as Life Science Technologies) and Zand, being two of the better-known suppliers. Check out www.amsonline.com and look up Prime One Concentrate. Or visit the Vitamin Research Products site at ww.vrp.com to look up Adapta-Phase I.

8) *Rhaponticum Carthamoides* is part of the Asteraceae family of herbs (formerly known as the Compositae family). Also known as *Leuzea carthamoides* and sometimes, Maral Root. The active ingredient found in these herbs is Ecdisten, a precursor to testosterone. Massive testing has been done in the former-USSR where national and world level athletes used Ecdisten to halve the number of steroid cycles taken during the year. Increasing testosterone to speed recovery is the point of taking steroids. Ecdisten does this – albeit the herb has milder effects – with no toxicity. *Rhaponticum Carthamoides* allow the athlete to recover faster after training or performance, as well as oxygenating muscles during exercise. This herb is used in Eastern-Bloc countries to keep patients from becoming catabolic after an accident or major surgery. *Rhaponticum Carthamoides* may be found in a product called Prime Plus, which is marketed by Life Science Technologies. Prime Plus is quite effective because it mates Ecdisten with Tribusponin, a highly refined extract of *Tribulus terrestris*, which is known for its strong anabolic and anti-catabolic properties. The synergy between the Ecdisten and Tribusponin was quantified in laboratory tests conducted by biochemist Dr. Igor Todorov. As well, Dr. Sergei Portugalov, Head of the Sport Nutrition Committee for the Russian Olympic Committee, uses Tribusponin as an integral part of the training regimen of his athletes. These guys win – if it didn't work they wouldn't use it and neither would I. Olympic Gold Medal winners Popov (swimming) and Chermenkin (power lifting) both used Prime Plus during the 1996 games in Atlanta. Prime Plus has been tested against IOC standards and is certified by the FDA, WHO, and IOC Anti-doping Committee to meet standards of the international sport community. *Rhaponticum Carthamoides* may be found from other sources as well. I currently use a product

---

[2]Flow-cytometric studies with eleutherococcus senticosus extract as an immunomodulatory agent. Arzneimittelforschung. 1987 Oct;37(10):1193-6.
Also: Scaglione F, Ferrara F, Dugnani S, Falchi M, Santoro G, Fraschini F. Immunomodulatory effects of two extracts of Panax ginseng C.A. Meyer. Drugs Exp Clin Res 1990;16:537-42

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED

called Adapta-Phase II made by Vitamin Research Products (one of the original developers of Prime Plus worked on this product as well).

9) *Rhodiola Rosea* is another adaptogen (like *Eleutherococcus senticosus* and *Rhaponticum Carthamoides*). Supplementation with *rhodiola* has been shown to improve physical endurance[3] and mental performance[4], and to reduce stress-induced fatigue. It exhibits cardio-protective and anti-cancer properties (in rats).

High Altitude and Cold Weather Supplements

1) Aspirin, according to doctors, helps prevent heart disease by inhibiting the formation of a hormone called Thromboxane A2, which causes platelet aggregation. Dr. Barry Sears, author of The Zone, says the hormone is "one of the most powerful vasoconstrictors known to man." While climbing in cold weather take 325mg (one tablet) every 8 hours to help keep blood "thin" and flowing to the extremities. However, if you are likely to get cut or shot consult your medic before taking too much. Aspirin's anti-clotting characteristics could cause you to bleed to death. Garlic is a better "anti-clotting agent" than aspirin, and reduces the stickiness of platelets, which improves overall blood circulation.

2) Garlic is an essential cold weather supplement. Buy garlic supplements with a standardized amount of S-allylcysteine - the strongest acting pharmacological compound found in garlic. Saponins, a steroid-like compound found in garlic, inhibit an enzyme in the muscle cells of the arteries, resulting in arterial dilation and reduced blood pressure, thus better circulation[5]. Reinhold Messner used garlic supplements for high altitude climbing because physiologists claimed they improved "vascular elasticity." Garlic is also a vasodialator whose properties ease circulation (helping counteract the *diuresis* -- blood-thickening -- associated with increased kidney function) notably in the lungs and this helps improve oxygen exchange. Garlic also increases the number of natural killer cells in the body[6], and improves immunity. This is backed up by the folkloric use of garlic to treat illness throughout the world.

3) Gingko Biloba: High Altitude scientist Dr Peter Hackett has recently had good results with prophylactic Gingko Biloba, which along with anti-oxidant effects also behaves like a vasodialator and appears to aid acclimatization. Dosage is approximate but these are good levels to start with: 80 - 120 mg twice a day, starting 5 days before ascent.

---

[3] De Bock K, et al. Acute Rhodiola rosea intake can improve endurance exercise performance. Int J Sport Nutr Exerc Metab 2004; 14(3):298-307.

[4] Darbinyan V, et al. Rhodiola rosea in stress induced fatigue--a double blind crossover study of a standardized extract SHR-5 with a repeated low-dose regimen on the mental performance of healthy physicians during night duty. Phytomedicine 2000; 7 (5):365-371.

[5] Wei Z, Lau BHS, *Nutr Res* 18(1):61-70, 1998

[6] Kyo E et al: *Garlic as an Immunostimulant*, Basel: Birkhauser Verlag, 1999

© Mark Twight, Mountain Mobility Group 2001-2007 ALL RIGHTS RESERVED