

Bovine Colostrum and Athletic Performance

What We Can Learn from the Super Athlete

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Professional athletes have always sought ways to enhance their performance, achieve better results, and gain an advantage over their competitors. The Olympian, or “super athlete” takes this to new heights, and in a world where performance is measured in milliseconds, any natural substance that enhances endurance and reduces recovery time determines who wins the gold and who wins the silver. Many of today’s super athletes are turning to bovine colostrum as a means to that coveted edge. The growth factors in bovine colostrum help burn fat, build lean muscle, build strength, shorten recovery time, and prevent illness after vigorous exercise.

Improved Recovery After Exercise

Early research with elite Australian athletes showed that supplementing with bovine colostrum was advantageous. After four weeks of supplementation, athletes had up to a 20% increase in strength, stamina, and endurance, and recovery time after intense exercise decreased by nearly half. These benefits, in turn, allowed them to train harder and improve performance. Dr. Jon Buckley of the University of South Australia pioneered much of this research,¹ and his results led the Australian Olympic team to put the majority of its athletes on the colostrum supplementation protocol (60 grams powdered colostrum daily), which led to the team winning a disproportionately high number of medals for such a small country in the 2000 and 2004 Summer Olympic Games. The Australians claimed that their winning advantage was attributable to their athletes’ colostrum supplementation during training.^{2,3} This did, however, result in an International Olympic Committee (IOC) inquiry into whether powdered bovine colostrum was a potentially banned substance.⁴ The IOC determined that colostrum was instead a super-food, and their ruling provided athletes with a safe, viable, and legal alternative to doping and



other banned substances.

Oxidative stress due to intense exercise contributes to muscle fatigue. Glutathione (and its precursors, cysteine, glycine and glutamic acid) can increase an athlete’s exercise capacity before fatigue sets in by neutralizing free radicals that otherwise cause inflammation and damage muscle tissue. Glutathione and its antecedents are abundant in colostrum.⁵ Added benefits of glutathione for the super athlete include regulation of other less effective antioxidants; anti-viral and anti-bacterial activity; immune system enhancement; enhanced functioning of lymphocytes; and carcinogen neutralization.

Increased Lean Body Mass

Increasing lean body mass and burning adipose tissue is critical for the high-caliber athlete, and increasing quantities of Insulin-like Growth Factor (IGF-1) in the body is the key to achieving success. This can be accomplished in any of three ways: (1) take Human Growth Hormone (HGH) injections; (2) perform weight bearing exercise 1-2 hours daily; (3) supplement with bovine colostrum. First, taking HGH is both unsafe and illegal, although often utilized by athletes. Injectable HGH has serious side effects

because it is made from recombinant DNA technology and is only 70% bio-identical to human growth hormone. Second, heavy workouts do cause the body to increase IGF-1 production, but not significantly. Colostrum supplementation is thus, the natural and ideal choice. Colostrum does not act like the anabolic steroid HGH, and is an all-natural super-food; its growth factors are nearly 100% bio-identical to that of humans. Physical activity is required for the growth factors to exert their fat-burning action at a dosage of 20 grams of powdered colostrum daily.⁶ Most studies show that four to eight weeks of colostrum supplementation are necessary to see results, and that daily use is required for maintenance of health benefits.

The Insulin-like Growth Factor (IGF-1) in colostrum is the real growth hormone which promotes muscle growth and favors adipose stores over glucose as a fuel source.⁷ IGF-1 is primarily produced by the liver and production is stimulated by growth hormone. IGF-1 is the only natural hormone capable of promoting muscle growth by itself. Although synthetic IGF-1 is banned by the IOC, naturally occurring IGF-1 in bovine colostrum supplements is not, and IGF-1 is abundant in bovine colostrum. During vigorous exercise, colostrum slows protein breakdown, and stimulates glucose transport in muscle. Muscles are then able to make more efficient use of the fuel available to them, which results in an increase in lean muscle mass without a corresponding increase in adipose tissue. Long-term colostrum supplementation increases IGF-1 levels.⁸ Daily colostrum supplementation benefits skeletal muscle tissue by reducing the oxidant-induced damage during exercise.⁹

Blood Glucose Homeostasis

Keeping blood glucose levels consistent throughout the day avoids catabolism, or destructive metabolism, in which muscle protein is broken down into

amino acids for fuel. When a person's glucose level begins to drop within two hours of the last meal, those amino acids are converted to glucose in order to raise the blood glucose back into homeostasis to insure the brain has a consistent fuel supply. The body is very efficient in this process, but rather self-defeating if the goal is to preserve or increase muscle tissue. During the fasting state between meals, the body is essentially consuming its muscle tissue to fuel the brain. On the other hand, anabolism, or productive metabolism, is the buildup of muscle protein from amino acids. Having some protein in the body's gas tank keeps the brain fueled and maintains muscle tissue. IGF-1 plays a critical role by preventing catabolism and promoting anabolism.

Blood glucose homeostasis also requires avoiding simple carbohydrates which rapidly increase blood glucose levels and then stimulate the pancreas to secrete insulin, thereby causing glucose levels to plummet. Hypoglycemia can produce symptoms, such as dizziness, lightheadedness, confusion, anxiety, and weakness, which may be temporarily debilitating. Depending on the exercise regimen and/or propensity for hypoglycemia, eating some type of protein every four hours is important. Colostrum contains amino acids and IGF-1, so it is ideal to supplement between meals.

Colostrum supplementation in diabetic athletes is critically important because maintaining near-normal blood glucose levels is essential to preventing diabetic complications. There is a delicate balance among diet, exercise, insulin, and/or anti-diabetic medication, and too much or too little of any of these can throw the whole system out of whack. Recent research showed that 5 grams of colostrum taken on an empty stomach in the morning and evening resulted in significant postprandial glucose measurements.¹⁰ An added benefit after 4 weeks was a significant decrease in both total cholesterol and triglyceride levels. Another study demonstrated similar results with reduced insulin requirements and a normalization of blood glucose levels in type 2 diabetics.¹¹ In both studies, the hypothetical mechanism of action is linked to increased levels of IGF-1 from colostrum that improves glucose utilization and stimulate glycogen and protein synthesis.

Tissue Repair & Accelerated Healing

The super athlete experiences injury at a high rate and although skeletal muscle does repair itself through regeneration, injured muscle does not fully recover its strength.¹² The natural growth factors in colostrum are significant to healing. IGF-1, highly expressed during the early inflammatory phase of an injury, appears to aid in fibroblast proliferation and migration and subsequently increases collagen production.¹³ Platelet-derived growth factor (PDGF) in colostrum helps stimulate IGF-1 production as well as other growth factors. Growth hormone has been shown to accelerate bone regeneration.¹⁴

Additionally, Transforming Growth Factor (TGF-alpha and TGF-beta) in colostrum stimulate the production and repair of DNA and RNA. Heavy exercise damages muscle fibers, tendons, and ligaments but TGF along with Fibroblast Growth Factor (FGF) and Epithelial Growth Factor (EGF) repairs them. FGF is a powerful stimulator of angiogenesis and a regulator of cellular migration and proliferation. Accelerated repair means that athletes recover more quickly from injuries and can resume training. Less downtime keeps athletes competitive and less likely to miss competitive events.

Improved Immune System Function

Following intense exercise, the immune system temporarily shuts down so that the body can recover from the physical stress. The production of T-cells and natural killer (NK) cells is suppressed. During training, athletes are consistently in an immune-compromised state which opens them up to opportunistic bacteria and viruses, particularly those that cause upper respiratory infections. Colostrum transmits immunity for common pathogens via antibodies, thereby effectively terminating the immune system shut-down. Bovine colostrum contains natural antibodies against *Enterococcus*, *E. coli*, *campylobacter*, *salmonella*, *staphylococcus aureus*, and *klebsiella pneumonia*, among hundreds of others. Athletes self-report a lower incidence of upper respiratory infections while taking bovine colostrum.^{15, 16} Research suggests that bovine colostrum is more effective than influenza vacci-

nations,¹⁷ so supplementation is an alternative if athletes object to vaccines.

Aside from antibodies, colostrum has other ways of dealing with infectious pathogens and allergens. The Proline-Rich Polypeptides (PRPs), short chains of amino acids, are powerful immune system modulators. Their mechanism of action is to either stimulate an underactive immune system or suppress an overactive immune system. PRPs do this by helping regulate the thymus gland and stimulate the production of either helper or suppressor T lymphocytes.¹⁸ PRP-2s primarily function as antimicrobials, and along with lactoferrin and lactoperoxidase, destroy viruses and bacteria on contact.¹⁹ Lactoferrin can also increase the production of NK cells. The PRP-3s primarily have an anti-inflammatory effect and help quell the immune system when it over-reacts to an otherwise harmless substance, as in the case of allergies.²⁰ PRPs are not species specific, which makes bovine colostrum an excellent and abundant source. PRPs are vital to returning the immune system to a state of balance, particularly when it has been over-taxed by strenuous exercise.

Prevention of Leaky Gut

Colostrum can also benefit the tendency for "leaky gut" that occurs with heavy exercise, thereby preventing heat stroke.²¹ Gut disorders are common in long distance runners. The physiological response to increased gut permeability is to expel gut contents, usually by diarrhea, which may diminish performance. Research showed that highly trained runners could experience a 250% increase in gut leakage accompanied by a two-degree body temperature increase. With daily colostrum supplementation for two weeks, that initial amount of gut leakage decreased by 80%, despite the same temperature increase.

To some extent, most people have some degree of Leaky Gut Syndrome (LGS), which makes the intestinal lining more permeable to macromolecules and pathogens. Frequently used antibiotics for upper respiratory infections along with non-steroidal anti-inflammatory drugs (NSAIDs) and prescription analgesics for muscular pain are the three primary causes of LGS and are consequences of high in-

tensity training. Bovine colostrum has been shown to reduce NSAID-induced intestinal permeability.²²

Other triggers of LGS include parasites, corticosteroids; birth control pills; GMOs; pesticide-contaminated foods; molds, yeast, and bacteria; an excessive intake of refined sugars, caffeine, alcohol, or food additives; surgery; and a decrease in blood supply to the bowel. Although super athletes are likely to be more health conscious than most, consuming contaminants in the food supply is generally unavoidable. The damage from LGS may not be obvious at first and take many years to develop, yet the major health consequences outside of GI pathogens are allergies and autoimmune diseases. Being the fittest of the fit does not preclude Olympians from having autoimmune diseases.

As mentioned previously, antibodies in colostrum can help ward off opportunistic bacteria and viruses. Colostrum's growth factors help heal gut ulcerations which otherwise allow pathogens to enter the bloodstream and reduce the efficiency of nutrient uptake. Colostrum allows more of the carbohydrates and amino acids from food to be utilized as fuel during exercise. The hypothesis is that healing a leaky gut will increase energy levels and even out performance, particularly in athletes with Irritable Bowel Syndrome (IBS) resulting from incomplete

digestion with protein supplementation.²³

Colostrum Dosing

There are differing opinions as to the optimal dosage. Early studies with Australian athletes utilized 60 grams of powdered colostrum daily, which may have been over-kill. Later studies showed significant results at 20 grams daily which is likely to be more in line with that which is necessary to produce the desired results.⁶ For athletic performance, colostrum should be taken 45-60 minutes prior to an intense training session. If the athlete has a propensity for hypoglycemia, colostrum should also be taken between meals and before bedtime.

Processing of pharmaceutical grade colostrum has improved significantly over the years, such that 10-20 grams of a high quality, efficacious product like Colostrum-LD® will produce the desired results, whether for athletic performance or anti-aging.

Colostrum Safety

There are currently no known contraindications for colostrum supplementation in super athletes or the general public. Colostrum supplementation is generally regarded as a non-invasive intervention, and therefore, safe. However, colostrum does contain milk proteins, so anyone with a dairy

intolerance should check with his/her physician. A pregnant or lactating athlete should also check with her physician.

Colostrum vs. Isolated Amino Acid Preparations

Bovine colostrum is different than other amino acid supplements intended for increased athletic performance. Foremost, colostrum is an all-natural, "whole food" supplement which contains more essential amino acids than singular amino acid preparations and even more than whey protein. Additionally, the handling of amino acids is critical to maintaining the specific health benefit each amino acid provides. Amino acids in whey protein are often denatured during processing; this is not the case with colostrum.

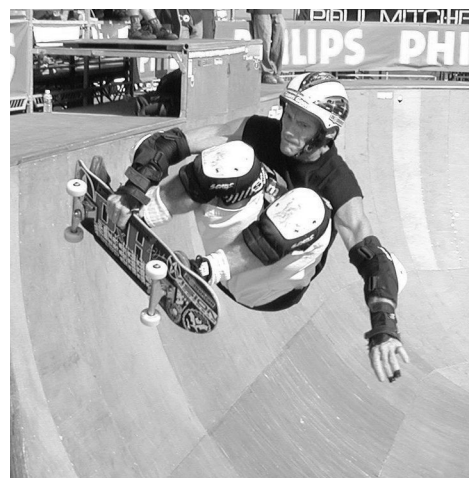
Creatine is widely used among athletes participating in activities involving intense, brief bursts of energy. Like all other isolated singular amino acid preparations, creatine is not a food, the way colostrum is. Because it is a preparation, it may contain impurities. Amino acid preparations are relatively new concepts and no long-term safety studies have been performed.²⁴ Bovine colostrum, on the other hand, dates back to ancient times and was referenced in the Old Testament's Book of Sirach as being one of the "necessities of life".²⁵ Ironically, colostrum has more

The Connection between Colostrum, Athletic Performance and Anti-Aging

When talking about the benefits of colostrum for athletes, we're essentially talking about anti-aging. Colostrum's ability to maintain lean body mass, facilitate fat loss, balance blood glucose levels, repair tissue and accelerate healing is just as significant for an athlete as for an aging person. The hallmark signs of aging include decreased muscle and bone mass and a loss of skin elasticity, which are manifested as loss of muscle tone, sagging skin, and wrinkles, as well as a plethora of autoimmune conditions. This is the result of the body beginning to taper off its production of growth hormone following maturity (around age 20). Although this is normal, supplementing with colostrum can help counteract the change by increasing

IGF-1 levels to pre-puberty levels. The immune and growth factors in bovine colostrum have other regenerative effects which promote healing and exert anti-aging benefits including anti-inflammatory effects, good bowel health, anti-microbial activity, cardio-protection, cancer cell inhibition, improved cognitive functioning, and delayed onset of dementia symptoms.

The best evidence of colostrum's power can be seen in senior athletes who are more than capable of participating in youthful/extreme sports activities and out-performing their younger counterparts. In the athletic world, "senior athlete" means forty and older, and these seniors attribute their strength, power, and endurance to colostrum.*



DON HAMILTON, pro skateboarder. "My strength and endurance are at an optimal level. You are only as old as you feel, and I feel young. My energy level is improved and more steady throughout the entire day. No matter how hard I try to gain fat, I can't (which is great)...colostrum only seems to

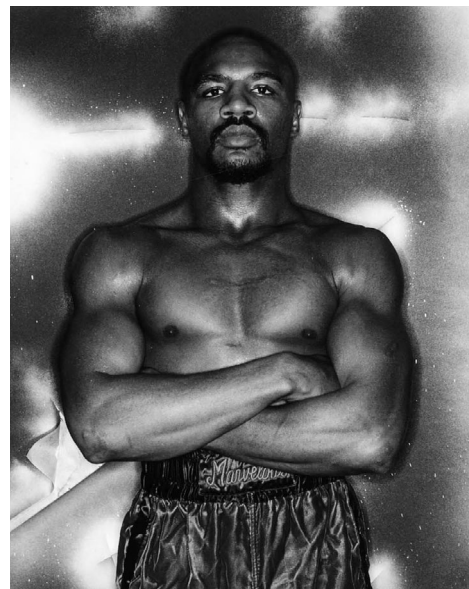
increase muscle size and strength. It speeds up healing and recovery time. I don't get sore after long, intense sessions of skating like I used to. In fact, I rarely have any muscle soreness now."

JOEY HINTON, elite triathlete.



"Colostrum has helped me in recovery, especially preventing me from getting run down after long training workouts. When I'm taking it, I feel strong (never sick), plus it keeps me lean. It is simply the best supplement for any endurance athlete. When you spend quality time in training, you need quality supplements to keep you healthy and ready to go on race day.

MARVIN HAGLER, former World Middleweight Champion boxer. Marvelous Marvin Hagler, a self-proclaimed colostrum advocate, included colostrum in his training regimen to extend his ability and performance beyond the confines of age.



recently been labelled the "new creation" by athletes and trainers.²⁶

Full Disclosure

Bovine colostrum and IGF-1 are not without controversy. Some research has shown that increased levels of IGF-1 accelerate growth of existing cancer cells,²⁷ but other studies failed to confirm the results. Certainly, there is no evidence that colostrum itself causes cancer. The proline-rich polypeptides (PRPs) and lactoferrin in colostrum actually increase the body's natural killer (NK) cells by up to 400%.²⁸ Any theoretical cancer cell proliferation due to IGF-1 would be attenuated by the significant number of NK cells.

In the late 1980's and early 1990's, Monsanto sparked outrage by developing recombinant bovine growth hormone (rBGH) for dairy cows that would lengthen milk production from ten months to eleven months. Armed with the fact that IGF-1 promotes cell division in certain cells, "reactivists" led the charge that rBGH would be expressed in the milk and the presumed increase in IGF-1 levels would exert a cancer-accelerating effect. Essentially, overplaying an over-simplified understanding of cancer growth spread great fear that drinking milk would cause cancer; no research has supported the idea that consuming colostrum causes or accelerates cancer.²⁹

As far as clinical studies that have reported conflicting results in athletic performance, there are two important considerations. First, studies have not been conducted with a standardized dose and length of supplementation.

Second, bioavailability of the active components in the specific colostrum product utilized in the study is typically not established.³⁰ Many colostrum products on the market today contain very little, if any, IGF-1 and TGF. This is because manufacturers dry the colostrum at high heat, which destroys the growth factors and turns the colostrum into nothing more than powdered milk. Future research on the influence of bovine colostrum on athletic performance will only be of value if these issues are addressed and high quality colostrum with verified bioavailability is used.

Efficacy & Quality Colostrum

Bovine colostrum for human consumption is essentially worthless if the active components have been destroyed during processing. The quality and thus, effectiveness of colostrum depends on four factors – the colostrum source, processing methods, testing and verification of active components, and Liposomal Enhanced Delivery (LD)³¹. Trainers and physicians who recommend colostrum supplements to athletes must recommend a high quality, efficacious product if they expect to see results. Colostrum-LD® is the number one physician-prescribed colostrum on the market today.

- Colostrum-LD® is obtained from pasture-fed dairy cows that are certified to be healthy, BST, BSE, and antibiotic-free.
- Colostrum-LD® is flash pasteurized and dried with low heat, as opposed to the high heat of milk pasteurization, which preserves rather than de-

stroys any of the bioactivity.

- Every batch of Colostrum-LD® is tested for quality, efficacy and safety in an FDA licensed facility.
- Liposomal Enhanced Delivery (microcoating of every colostrum particle) is applied to ensure that Colostrum-LD® will bypass digestion and the healing components will remain bioavailable at the cellular level.

Conclusion

Athletes will go to great lengths to achieve superior performance, as evidenced by seemingly pervasive doping and illegal growth hormone use in professional sports. There is an alternative that won't cause unnecessary harm later in life for professional athletes who want to improve performance naturally, healthfully, and within the guidelines of their respective governing authorities. The super athletes choose bovine colostrum. Bovine colostrum can help shorten recovery time following intense exercise; build lean muscle mass; burn adipose tissue; maintain ideal blood glucose levels; accelerate healing of injuries; preserve and boost immune function; and heal Leaky Gut Syndrome. Weekend warriors and everyday exercisers can benefit as well, without feeling the need to put harmful or unproven substances into their bodies.

References to this article and other related clinical studies can be found at www.CenterforNutritionalResearch.com.

These statements have not been evaluated by the Food and Drug Administration (FDA). These products are not intended to diagnose, treat, cure or prevent any disease.