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The Colostrum Edge?

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In a previous MD article, I described the importance of ingesting quality protein in your diet in order to maintain the availability of essential amino acids necessary to promote growth and recovery. I also suggested that dietary supplementation of protein (e.g., soy, egg, caseine, whey, etc) may serve as a convenient way of increasing the quality of protein in the diet.[1-3] Whey protein is generally regarded as the highest quality protein available to athletes.[1-2] However, a potentially more beneficial form of quality protein has been recently marketed to athletes – bovine colostrum. This article discusses the potential ergogenic value of bovine colostrum supplementation for athletes.

What is Bovine Colostrum?

Bovine colostrum (BC) is the milk produced by cows during the first few days after calving.[4-6] It has greater nutrient density and higher protein quality than ordinary dairy milk. For example, the Protein Efficiency Ratio (PER) of BC is about 3.0 which is higher than the PER of beef/fish/poultry (2.0 – 2.3) and soy (1.8 – 2.3). Additionally, the PER of BC compares favorably to egg (2.8), milk protein (2.8), caseine (2.9), and whey protein (3.0 to 3.2). This means that BC is an excellent source of quality protein. However, BC also contains high concentrations of growth factors (IGF-I, IGF-II, TGF β), immunoglobulins (IgG, IgA, IgM), and antibacterials (lactoperoxidase, lysozyme, and lactoferrin) not found in these other sources of proteins.[4-6] In fact, the concentration of many of these compounds is much greater than human colostrum (breast milk). Collectively, these bioactive compounds serve to strengthen the immune system and promote growth. For this reason, BC has been marketed as a unique source of quality protein, growth factors, and immuno-enhancing compounds in numerous food products (e.g., infant formulas, protein supplements, etc).

Theoretical Value of Bovine Colostrum Supplementation

There are four primary reasons that BC may affect training and/or performance. First, BC may serve to enhance the quality of protein in the diet thereby serving to maintain availability of essential amino acids (EAA).[3] As described in a previous MD article, maintaining availability of EAA during training is essential to promote tissue repair and growth. Second, recent studies indicate that provision of EAA after exercise with carbohydrate serves to enhance protein synthesis.[7] Consequently, ingesting carbohydrate with a quality protein source containing a high concentration of EAA following exercise may promote greater gains in strength and muscle mass during training. Third, BC contains a high concentration of insulin-like growth factors (IGF-I, IGF-II). These growth factors have been shown to promote anabolism and stimulate cell growth in part by mimicking some of the actions of growth hormone.[4-6] Theoretically, increasing availability of growth factors through BC supplementation may promote greater gains in strength and muscle mass during training. Finally, BC contains high concentrations of immunoglobulins and antibacterial compounds. Animal and human studies indicate that BC supplementation can increase the availability of these compounds and thereby strengthen the immune system.[4-6]

Theoretically, BC supplementation during training may help keep an athlete healthy during intense training.

Effects of Bovine Colostrum Supplementation in Athletes

There is fairly strong evidence from animal and human basic research that indicates BC supplementation can increase the availability of growth factors and improve immune function.[4-6] However, less is known regarding the potential ergogenic value of BC supplementation during training. A recent study by Mero and colleagues[4] from the University of Jyv@skyl@ in Finland evaluated the effects of 8-days of BC supplementation during training on IGF-I, immunoglobulins (IgA, IgG), hormones (insulin, testosterone, cortisol, and growth hormone), amino acids, and high intensity exercise performance. In a double-blind and randomized manner, nine trained male sprinters and jumpers participated in three experimental sessions lasting 8-days. One session was used as a control session and two sessions involved dietary supplementation of liquid BC or a milk/whey protein placebo. Subjects ingested 67.5 ml of the supplement twice daily during a standardized training period. Blood and saliva samples were obtained prior to the start of supplementation and on the morning of the sixth day of supplementation. Subjects then ingested a standardized meal and donated blood and saliva samples prior to performing a counter jump performance test and a 90-minute exercise bout consisting of a series of jump, sprint, and strength tests. Blood and saliva samples were measured several times following the exercise bout as well as on day 7 of supplementation and one-day following supplementation (day 9). Results revealed that BC supplementation significantly increased IGF-I levels in a linear manner from pre to post-training. The change in IGF-I was significantly correlated to changes in insulin levels. These findings suggest that BC increased anabolism during this training period. No significant differences were observed among groups in growth hormone, testosterone, cortisol, or amino acid profiles. Additionally, no significant differences were observed among groups in exercise performance capacity. These findings suggest that short-term BC may influence anabolism by increasing IGF-I levels. Theoretically, BC supplementation during training may therefore promote greater gains in strength and muscle mass.

John Buckley and colleagues from the University of South Australia have recently presented several research papers on the effects of BC supplementation on exercise capacity.[8-10] In their first study[8], 39 male runners participated in an 8-week running program (3 x 45-minute runs per week at anaerobic threshold). During this time, subjects ingested in a double-blind and randomized manner either 60 grams per day of BC powder or whey protein powder which served as a placebo. At weeks 0, 4 and 8 of training and supplementation, subjects performed two treadmill running tests to exhaustion and donated fasting blood samples. Results revealed that BC supplementation did not affect plasma IGF-I levels throughout the study. Additionally, that 4-weeks of BC supplementation did not significantly enhance run performance capacity in comparison to the placebo group. However, following 8-weeks of supplementation, run performance capacity in the second treadmill run was significantly improved in the BC in comparison to the placebo group. These findings suggest that long-term BC supplementation may affect training adaptations in runners.

In the second study from this group[9], 51 males participated in an 8-week resistance and plyometric training program. In a double-blind and randomized manner, subjects ingested either 60 grams/day of BC or whey protein. At weeks 0, 4, and 8, subjects donated fasting blood samples and completed two exercise bouts consisting of performing three 20 meter sprints, vertical jumps, 10-second sprints on a cycle ergometer, and maximal voluntary contractions of the knee extensors and flexors. Results revealed that BC supplementation had no effect on plasma IGF-I levels. However, vertical jump performance was increased to a greater degree in the BC group. There was also some evidence that BC improved peak power output and force

during the maximal cycle ergometer sprints. These findings provide some support that BC supplementation during training may enhance anaerobic power.

The most recent study[10] evaluated the effects of BC supplementation on rowing performance in elite female rowers. In this study, eight competitive rowers ingested either 60 grams/day of BC or whey protein in a double-blind and randomized manner during a 9-week training period. Prior to and following supplementation, subjects performed two rowing test sets consisting of a series of submaximal and maximal effort rowing tests. Results revealed that gains in submaximal rowing performance over the 9-week training period were similar between the BC and whey protein group. However, BC supplementation promoted significantly greater gains in distance covered and total work completed during the first and second maximal effort rowing tests. These findings suggest that BC supplementation during training may promote greater gains in high intensity exercise performance capacity in elite female rowers.

Summary Analysis

Research supports contentions that BC can serve as a source of high quality dietary protein. Additionally, that BC may have some added benefit in comparison to other forms of protein due to a high concentration of growth factors, immunoglobulins, and antibacterial compounds. BC supplementation has been reported to increase availability of growth factors and enhance immunity in animals and humans. Theoretically, this may promote greater gains in strength and muscle mass during training. However, although there is some preliminary evidence to indicate that BC supplementation during training can increase IGF-I and/or enhance training adaptations, most of the available evidence is preliminary in nature. Consequently, it is my view that although BC can serve as an excellent source of dietary protein, additional research is necessary before definitive conclusions can be made regarding its ergogenic value for athletes.

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