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Analysis of Commonly Used Sport Supplements

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Abstract: The famous Olympic phrase "faster, higher, stronger" continues to inspire millions of athletes who strive to improve their athletic performance. There has also been a debate in sports history over whether to allow athletes to use sports supplements. This article aims to analyze several different commonly used sports supplements. At the same time, this study also provides a scientific method of supplementing sports supplements for athletes according to the different functions and disadvantages of these supplements. In the end, it can be concluded that, in combination with the various needs of athletes, different supplements can help athletes recover quickly to maximize their potential during sports.

Keyword: sport supplements nutrition creatine protein exercise

1. Introduction

Sport supplements, being created in order to enable athletes to achieve sports performance that cannot be achieved by ordinary training methods in the process of sports training, in order to fully tap the sports potential of athletes, other training methods are used to enhance the athlete's own production capacity, energy control level, and a procedure or chemical substances bundle that increases energy utilization[1]. Also recognized as ergogenic aids, due to the improved range of selections of food by the development of economic,have been widely use so as to take in more necessary nutrition for exercise and sport. Sport supplements provides body high-purity, easily absorbed nutrition or combinations of nutrition for enhanced supplementation to reduce fatigue , improve respiratory and muscular function, accelerate metabolism during exercise, and to enhance athletic performance. Nutrition in sport is receiving more and more attention from the scientific world, as evidenced by the specialized magazines and publications in this regard, which has recorded a sharp increase in the last 20 years[2]. As the development of medical science and physiology, numerous of sport supplements appear on the account of higher demands for specific targeted and high purity sport nutritional supplements. By the confusion of not just the ways to recognize the nutrition needed in sport supplements, but also the combinations of nutrition intake throughout sports and exercises. This research aims to provide advice on sports supplement intake with efficiency and target. Analysis is presenting four common used sport supplements or nutrition, and exploring the connections between these supplements in order to promotes the advantages and the future of combining sport supplement.

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2. Analysis

2.1. Creatine pyruvate

ATP (Adenosine Triphosphate) is the only source of energy provided during exercise that directly turns chemical energy into kinetic energy. There are three main ways to produce ATP. One of the ways is the phosphagen system, which provides energy rapidly during quick and intense exercises. Creatine phosphate is essential in this process of forming ATP by combining with ADP. As a result, creatine pyruvate can improve an athlete's performance during short-burst exercises such as weightlifting or distance jumping. Creatine is an amino acid-derived metabolite primarily found in skeletal muscle, obtained by endogenous synthesis and ingestion of meat products[3]. Pyruvate inhibits fat synthesis, lowers insulin concentration, and promotes lipolysis[4]. According to research on the cardiovascular system [5,] creatine significantly slows the rise of body temperature and heart rate, as well as the decrease of muscle oxygen saturation, reducing recovery time and improving exercise ability. Creatine supplementation during exercise reduces the incidence of associated muscle damage or impaired thermoregulation[6]. But on the contrary, creatine can cause weight gain and muscle soreness. Creatine can be constantly used before and after the exercise by athletes who working on advance sports performance to enhance the strength of muscle and also reduce the time for recovery.

2.2. Glutamine

The activity and ability of the immue system will be low in the short term just after the end of sport and exercise. Glutamine is the main energy source of macrophages in the immue system[7]. Glutamine peptide is an important regulatory factor in the body, which can effectively regulate the blood ammonia content in the body's muscle tissue, buffer lactic acid, and alleviate its adverse effects on the body. It can also increase the concentration of white blood cells in plasma and immunoglobulin in serum, which improves the body's immunity after exercise. At the same time, it also speeds up the recovery process and builds muscle mass faster than other nutritional sports supplements [8]. It reduces muscle soreness and improves muscle tissue repair by stimulating muscle protein synthesis and muscle tissue growth [9]. Finally, it can help muscle glycogen resynthesis and post-exercise immunity, increase muscle strength and volume, alter intestinal hormone release, and improve metabolic disorders to activate antioxidant defense systems and promote repair of damaged cells [10].

2.3. Protein and amino acid

Protein is one of the most important nutritions that the human body can create independently. But in order to build stronger muscles with higher muscle contraction force and longer contracting length by exercising, extra supplements of amino acids and proteins such as BCAA(branched-chain amino acids) or whey protein are essential for greater numbers of sarcomere. Proteins are also used to form enzymes by our body to be involved in the glycolysis system of producing ATP for energy. And also, experiment on endurance training have shown that different amounts of whey protein have a significant impact on the maximum oxygen uptake of the human body. It contains sugar, fat, and protein, which may promote the synthesis of protein and muscle glycogen in the body, delay the generation of fatigue, and improve the maximum oxygen uptake capacity[11]. At the same time, it can also enhance immunity, promote skeletal muscle protein synthesis, reduce muscle soreness, thereby speeding up the repair of sports injuries, as well as speeding up the recovery of the body after training. According to the research （Lollo PC, Amaya-Farfan J, Faria IC） Timely supplementation of branched-chain amino acids(BCAAs) can provide a material basis for aerobic metabolism during long-term endurance exercise[12]. Energies can be used to repair and rebuild damaged muscle cells, which is beneficial to improving nitrogen storage in the body and enabling athletes to maintain adequate physical strength. and good competitive conditions.

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2.4. Caffeine

Caffeine, also known as trimethylxanthine, is a compound that occurs naturally in plants.Immediately absorbed after ingestion from the gastrointestinal tract, then penetrates cell membranes into tissues, can pass through the blood-brain barrier, and then antagonizes adenosine receptors to reduce fatigue. It can be used to reduce the perception of fatigue or pain during exercise. Caffeine supplementation has a positive effect on endurance training or exercise, especially when athletes are training harder during critical training periods when they are already fatigued.

3. Discussion

The combinations of various kinds of sport supplements with different functions can works the near perfect result of exercise performance from the start to the end. For instance, for a weightlifter, taking caffeine and creatine can both reduce the pain from muscle but also ensure the instantaneous supply of ATP produce by phosphagen system. After the lifting, taking glutamine and proteins can help rebulid immue system and repair damaged cell to decrease the possibility of sport injuries. Furthermore, taking combinations of sport supplement can solve the problems of side effects. The soreness of muscle caused by taking creatine pyruvate can be solved by taking whey proteins to help relief. Even glutamine peptide can fully regulate the synthesis and decomposition of proteins in muscle cells, thereby alleviating muscle damage during exercising. Athletes should listen to the advice from professional sport science or physiology coach to make targeted selection of sport supplements and to avoid unnecessary waste and extra burden for body.

4. Conclusion

In conclusion, different types of common uesd sport supplements can lead to various of effect to body before, after, and during exercises.And by the combinations of sport supplement, a complete supplements intake plan can be make with different exercise situation. And targeted plan can maximize the function from warm-up to recovery stage.But there are still many not mentioned advantages and drawback of combining sport supplements plan. In the near future,a deeper research of combing sport supplements should be make with more practical experiments.

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